

OVERSEAS NEWS

Danes to seek EEC fish action over UK

By William Dullforce in Stockholm
DENMARK'S Fisheries Minister, Mr. Svend Jakobsen, goes to the EEC Fisheries Ministers meeting in Brussels today with no expectation of settling Denmark's dispute with Britain over the Norway pout box.

U.S. cautions Moscow over Vietnam conflict

BY JUREK MARTIN, U.S. EDITOR, IN WASHINGTON
THE U.S. has publicly and privately been warning China, Vietnam and the Soviet Union not to permit the Chinese-Vietnam border conflict to widen into a regional war.

Administration's main hope is that China plans no permanent occupation of Vietnam, but intends primarily to punish Hanoi for its recent victory over the Chinese-sponsored Government in Cambodia.

Kahn of the U.S. Ambassador to Afghanistan. In his public statements over the weekend, the Administration has been most careful not to appear to take sides.

normalisation of relations with China may be harmed by this outbreak in hostilities. An official pointed out over the weekend that normalisation was "an accomplished fact and will not be reversed."

Housing starts decline by 20%

BY STEWART FLEMING IN NEW YORK
SIGNS of the long-awaited slowdown in the U.S. housing industry are apparent in the latest figures for the industry which the Commerce Department has released.

Through most of 1978 housing starts ran at an annual rate of 2m, a level established early in 1977. In both 1977 and 1978, however, the annual rates in January were well below average at 1.3m units (1977) and 1.5m units (1978).

UN fails in bid to send troops to south Lebanon

BY IHSAN HIJAZI IN BEIRUT
ISRAEL has blocked moves by the United Nations to deploy peace-keeping forces in the border area in southern Lebanon. The Israeli stance was conveyed at talks in Jerusalem two days ago with UN officials.

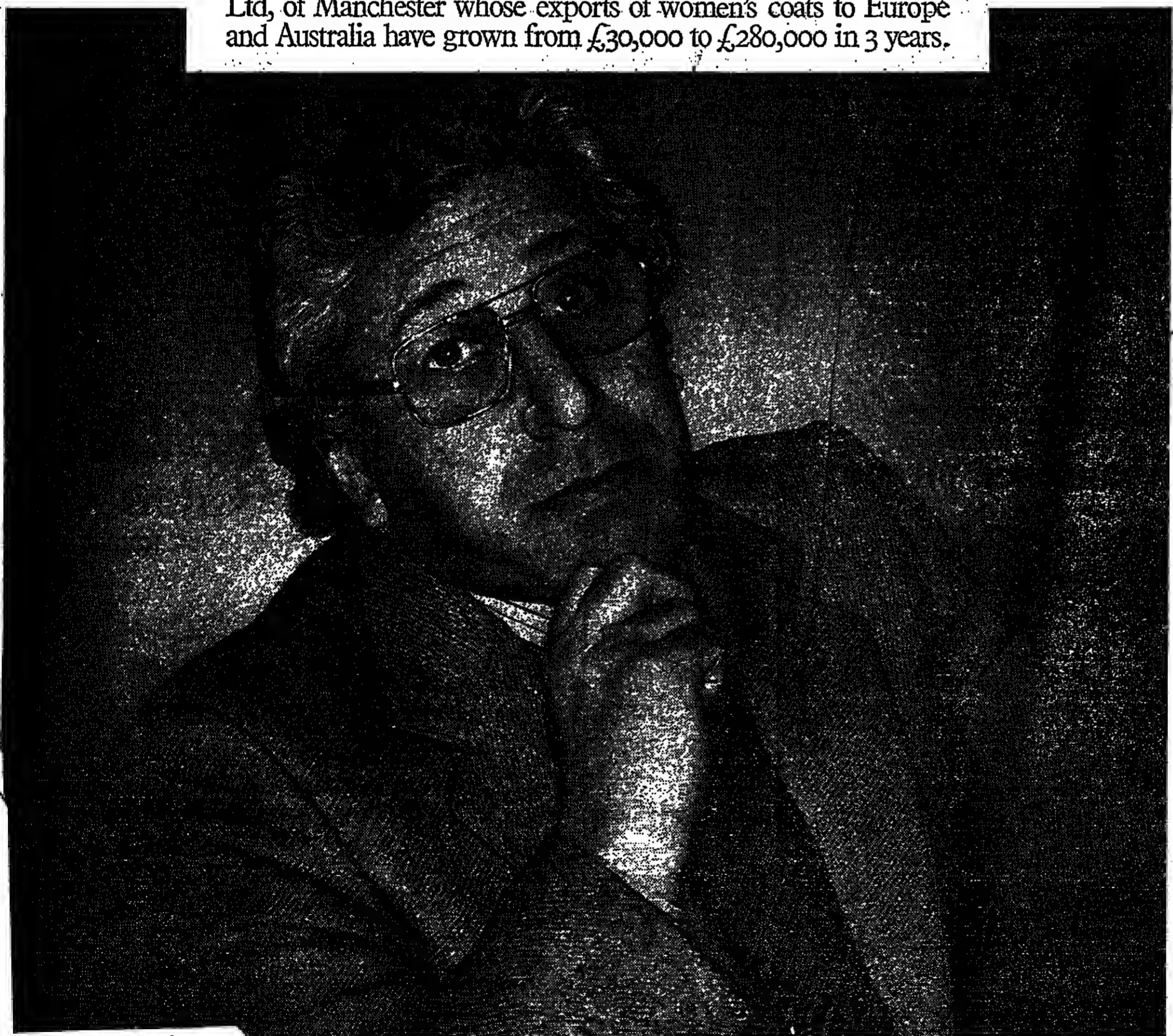
militiamen, and for deploying units on the Lebanese army alongside UN outposts. Government officials were quoted in the Press here yesterday as saying that without firm guarantees, Lebanese troops will not be sent to the south.

"When you first realize you can sell overseas, somehow it gives you a new sense of freedom and independence. Suddenly you've got the whole world to go at. You know what I mean?"

"Of course, there are problems, too: cash flow, for instance, especially in a seasonal fashion business like mine. But, with ECGD's bank guarantees, the bank lends me money for exports at low interest rates and I get payment on shipment. It's like having bills discounted cheaply—and virtually guaranteed. Fantastic!"

"I'm no P.R.O. for ECGD, but I really do believe they're on my side, even on the rare occasions when they refuse a risk."

Murray Sherman is Managing Director of High Fashions Ltd, of Manchester whose exports of women's coats to Europe and Australia have grown from £30,000 to £280,000 in 3 years.



KILLING OF US ENVOY IN KABUL

Head of Afghan security denies Soviet involvement

BY DAVID HOUSEGO IN KABUL
The head of Afghanistan's security forces Commandant General Daoud Taroon denied in an interview here that Russian advisers were present at the hotel where U.S. Ambassador Adolph Dubs was held hostage by terrorists last week before being killed.

Tough new measures against hostage-taking

BY BRIJ KHINDARIA IN GENEVA
KIDNAPPINGS such as those of industrialists Hans Martin Schleyer and Baron Empain will become more hazardous for terrorists or just plain criminals because of a new international treaty against the taking of hostages.

Tanzania and Uganda agree to peace talks

NAIROBI—Uganda and Tanzania will discuss ways of ending their border war in Nairobi on Wednesday at a meeting arranged by the Organisation of African Unity, officials of the organisation said yesterday.

Light polling as Bangladesh chooses its MPs

DACCA—Voting was light in Dhaka yesterday as Bangladesh went to the polls to elect its second Parliament since independence in 1971. The 300-member Parliament will be the first under the rule of President Zia-Ur Rahman, who came to power three-and-a-half years ago.

Rhodesian raid 'routine'

BY TONY HAWKINS IN SALISBURY
RHODESIAN officials denied last night that Saturday's airstrike against guerrilla bases near Livingstone, close to the Zambian border with Rhodesia, was in retaliation for last week's shooting down of an Air Rhodesia airliner at Kariba.

EGGD insures from date of contract or... Report Credits Guarantee Department... EGGD INSURANCE FOR BRITISH EXPORTERS.

UK NEWS

Europe's MPs are warned against 'power grabbing'

BY REGINALD DALE

THE directly elected European Parliament should adopt a pragmatic, cautious attitude to its work and not seek to grab power by openly clashing with the EEC's other institutions.

be found in developing democratic control in areas where it does not already exist, he argues. This means "finding new fields" to conquer rather than seeking to camp out on someone else's already well-cultivated front garden.

would not only be pursuing an entirely inappropriate path but also one likely to be extremely damaging to the European Parliament's prospects of increasing its influence.

Household insurance likely to rise 25%

BY ERIC SHORT

A 25 per cent increase in premium income for British insurance companies on household accounts this year is forecast by stockbrokers Wood Mackenzie in its latest review of composite insurance companies.

householder accounts. The companies have endeavoured to lift the sums insured to the correct level by index linking. They are now imposing severe penalties on those policyholders who do not keep sums insured up-to-date.

Decision soon on Tarling appeal

By Tim Dickson

MR. RICHARD TARLING, the former chairman of Haw Par Brothers International who faces extradition to Singapore, is expected to hear in the next few days the outcome of his appeal to the Home Secretary.

Britain worse off but the slide can be halted

BY PETER RIDDELL, ECONOMICS CORRESPONDENT

BRITAIN'S economic position has deteriorated in the last three months but is still, on balance, sounder than it was in 1978.

bad weather and lorry drivers' strike are temporarily boosting prices, the rate of price inflation should not accelerate this year back to the levels of the mid-1970s.

Irish party seeks closer Ulster ties

A POLICY document urging a close political alliance between Ulster and the Republic of Ireland was published today by Fine Gael, the republic's main opposition party.

Certificate lifts National Savings

BY TIM DICKSON

BIG FLOWS into the new 18th certificate boosted net National Savings receipts to £161.7m in the four weeks to February 2.

accounts had their best month for a year. An important factor was the increase by 2½ points to 12 per cent at the start of the month in the interest paid on investment accounts.

Slower growth is forecast

BY DAVID FREUD

BOTH long- and short-term interest rates now look extremely high in real terms, and this is likely to cause significantly slower economic growth this year.

mand will therefore have to come from the private sector, and is likely to be the result of slower growth in gross domestic product.

Bid to improve shop efficiency

A PROJECT to improve labour efficiency in the retail trade has been launched by the National Economic Development Office in conjunction with the industry's training board.

Lloyds Bank Group Results 1978

Group profit before tax was £182m

This is a 9.6% increase over the figure for 1977, but because of inflation is worth little more in real terms. International activities produced much the same profit; UK earnings benefited from good growth in current account balances and lending.

Out of this, tax takes £59m

Changes in accounting for deferred taxation have reduced this.

and proposed dividends take £17m

The maximum permitted, this is a small increase in real terms, the first for six years.

so profit retained is £106m

This contributes to shareholders' funds now amounting to £1,034m and helps to support world-wide operations and a balance sheet totalling £14,750 million.



Lloyds Bank Group

Rights Offering

The Bank of Nova Scotia Offering of 5,156,250 Additional Shares

(par value \$1 per share)

The Bank of Nova Scotia is offering to its shareholders of record on February 7, 1979, the right to subscribe for additional capital stock on the basis of one new share for each eight shares held.

Subscription Price: \$21.75 per Share

The rights expire at the close of business on March 15, 1979

For full particulars, reference should be made to the formal offer from the Bank to its shareholders dated February 12, 1979. In addition, an information circular has been prepared. Copies of the above and assistance regarding this offer may be obtained from any of the undersigned.

- List of financial institutions: Burns Fry Limited, Wood Gundy Limited, Dominion Securities Limited, Merrill Lynch, Royal Securities Limited, Nesbitt Thomson Securities Limited, Midland Doherty Limited, Scotia Bond Company Limited, A. E. Osler, Wills, Bickle Limited, Geoffrion, Robert & Gélinas Ltd., Mead & Co. Limited, Odlum Brown & T. B. Read Ltd., Casgrain & Company Limited, Winslow & Winslow Limited, MacDongall, MacDongall & MacTier Ltd., Tassé & Associés, Limitée, S. G. Warburg & Co. Limited, A. E. Ames & Co. Limited, Pitfield Mackay Ross Limited, McLeod Young Weir Limited, Lévesque, Beauchien Inc., R. A. Daly & Company Limited, Pemberton Securities Limited, McLean, McCarthy & Company Limited, Gardiner, Watson Limited, Equitable Securities Limited, John Graham & Company Limited, Molson, Rousseau & Co. Limited, Burgess Graham Securities Limited, Saunders Hatt Limited.

Problems for Hemerdon may be solved soon

BY PAUL CHEESERIGHT

THE LEGAL tangles surrounding the ownership of Hemerdon Mining and Smelting which is involved in what could be the biggest UK metal mining project of this century, are close to being unknotted and may be settled in the Supreme Court of Bermuda next month.

The company is in a joint venture with Amax Exploration of the U.S. to decide whether a tungsten-tin-china-clay deposit at Hemerdon Ball, outside Plymouth, can be exploited. It is originally set up by Mr. W. A. Richardson, who raised money for it largely in Canada and the U.S.

No shares of the 5m in issue have ever been allotted. They are held in trust by a bank in Bermuda, where the company is registered, by order of the Supreme Court. Legal problems have arisen about the rightful ownership of the shares.

"We are getting closer to reaching an understanding with Mr. Richardson, that he will assist and co-operate with the trustee rather than delay and frustrate," Mr. Uwe Manski of Dunwoody of Toronto said at the weekend.

Dunwoody has been appointed trustee for the grubstakers — those who financially supported Mr. Richardson — by the court.

Mr. Richardson, whose executive control of Hemerdon ceased in December 1976, claims 1m shares. The problems faced by Dunwoody in its negotiations with him centre on the fact that 1,600 grubstakers claim a right to a total of a further 9m shares. Thus there are claims to

double the amount of shares in issue. Records of share promises in the 1960s and early 1970s held by Dunwoody tally to some degree with records held by Mr. Richardson, but difficulties have arisen about those who have been offered shares in payment for services given to Mr. Richardson.

It seems likely that Dunwoody will be able to go back to the Supreme Court in Bermuda next month with a partial list of potential shareholders agreed with Mr. Richardson and the present Hemerdon management but that the court itself will have to rule on contested claims, including that of Mr. Richardson.

If the issue of share ownership is settled the company can press ahead with plans for over-the-counter trading of its shares in the U.S. This will open the way to raising new finance if there should be a decision to exploit Hemerdon Ball.

The company's immediate financial problems over investigation of the deposit were eliminated when its joint venture agreement was signed with Amax, which is shouldering the costs of drilling, metallurgical testing and economic feasibility studies.

Any decision on mine development in the early 1980s would involve Hemerdon in finding funds for capital investment, if it is to maintain a 50 per cent interest in the project.

Verdict tomorrow on two Clydeside plants

BY LISA WOOD

THE FATE of Marathon Shipbuilding, Clydebank, and Goodyear Tyres, of Drumchapel, both U.S.-owned, will probably be decided tomorrow. Both plants risk closure with the loss of nearly 2,200 jobs.

Mr. Bruce Millan, Scottish Secretary, is to meet Mr. Gene Woodfin, chairman of Marathon Construction, of the U.S., tomorrow in an attempt to reverse the company's rejection of a Government order for an oil-drilling rig from the Clydebank yard.

Goodyear's management is simultaneously to make a statement on the future of its Scottish tyre plant.

More than 500 Goodyear workers rejected a management scheme to cut losses by revising working practices. The management had threatened closure if they rejected the plan. Redundancies would have been limited to 57 in the company's proposals.

The British National Oil Corporation has been negotiating with Marathon on behalf of a state consortium including British Gas and the Scottish Office. It refused to pay more than £11m for a rig, but the company is believed to want £500,000 more.

Marathon employs 1,100 workers and has only a few weeks' work left.

Mr. Millan wants the Marathon yard to remain open, but is unlikely to be able to increase the offer because of Treasury opposition and the danger of infringing international agreements on the level of state aid to commercial manufacturers.

Mr. Jimmy Reid, outtitting convener at Marathon, said last week that it was scandalous that negotiations had been broken off over such a paltry sum.

The workforce has offered to increase productivity to cover the price gap between the Corporation's offer and what Marathon is prepared to accept.

Lamb imports put into store as price drops

FINANCIAL TIMES REPORTER

NEW ZEALAND is to reduce supplies of lamb available in Britain by putting large quantities into store, in an attempt to stop prices falling.

The lorry drivers' strike in January has resulted in large supplies of New Zealand lamb building up just at a time when new-season shipments start coming in. The prospect of an influx of supplies has pushed prices down sharply and already lowered the return to New Zealand farmers.

A spokesman for the New Zealand Meat Producers Board in London confirmed yesterday that meat exporters in New Zealand had been asked to arrange for an extra quantity of lamb shipments to be put into store in Britain.

He said that talks were going on with the meat trade in Britain on ways to stabilise the decline in prices.

It is reckoned that about 10,000 tonnes of New Zealand lamb may be put into storage out of the 25 to 30,000 tonnes shipped to the UK this month.

New Zealand is understood to fear that if its lamb prices fall too low in Britain there may be repercussions from continental members of the European Community.

Mirror shelves Glasgow plans

By Ray Perman, Scottish Correspondent

MIRROR GROUP, the Reed International publishing subsidiary, has shelved plans to start a new evening newspaper in Glasgow.

Preparations were well advanced. The title, PM, had provisionally been chosen and dummy editions had been printed.

But Mirror and Reed executives have decided that the project should be put off at least until the autumn.

Mirror Group already publishes successful morning and Sunday newspapers from Glasgow. The city's only evening paper is the Evening Times, published by George Outram, a subsidiary of Scottish and Universal Investments.

Coopers and Lybrand to probe Channel plans

BY LYNTON McLAIN

THE EUROPEAN Commission has awarded Coopers and Lybrand Associates a contract to study proposals for a road and rail link between Britain and France.

A variety of proposals will be examined, including the British Rail plan for a 650m single bore rail tunnel under the Channel.

Other proposals expected to be studied include a combined road-rail tunnel which would surface at suitable points near sand banks. Bridges will also be studied, but the company will be concerned more with revising earlier traffic flow estimates, than with engineering cost evaluations.

The study is to be undertaken to illustrate an EEC Commission study, part of which is also being carried out by the company, on how best to measure the benefits to the Community of major infrastructure projects.

Planners agree CBI's Centre Point plan

By John Elliott, Industrial Editor

THE Confederation of British Industry has cleared one of the hurdles it was facing in its attempt to take over London's Centre Point office block as its headquarters.

The planning committee of Camden Council approved the CBI's application to convert the block's showrooms into a council chamber. Without this approval, which has to be ratified by the full council, the CBI would have abandoned its interest.

It is, however, still not certain that the CBI will occupy Centre Point, which has been virtually empty since it was built in 1965. This is because publicity given in December to the CBI's interest has led to other buildings being brought to its notice.

The developers of a building in the Vauxhall Bridge Road, also a possible future home for the CBI for many years, are believed to be considering new initiatives.

Nevertheless, Centre Point remains the front runner. Providing no snags emerge, the CBI will now have to decide whether it considers it is worth spending some £2.5m on converting the bottom half of the 30-storey office block to its needs.

By joining a bigger group Yuki, which includes Barbra Streisand and Margaret Thatcher among its clients, will obtain organisational and financial backing to develop further its existing design business.

It could therefore advance from being an admired concern in the world of high fashion to a position alongside the household names of textile design such as Mary Quant and Hardy Amies.

The intention is that Yuki, who would himself act as managing director with Dr. Blackburn as chairman, should operate in three main areas. They are haute couture, where Yuki has established a reputation for

Yuki weaves link with Rivington Reed

BY RHYS DAVID, TEXTILES CORRESPONDENT

lavish use of very fine denier women's wear fabrics; ready-to-wear, an area where Rivington Reed believes it can help Yuki expand; and other non-apparel areas, where it is hoped to build up new business.

Dr. Blackburn said yesterday that Yuki would remain an independent company, free to enter into licensing agreements with other companies, although with some limitations if there was a conflict with work being done for Rivington Reed.

Besides giving Yuki the chance to develop into new fields, the arrangement provides a firm indication of Dr. Blackburn's own ambitions for his group. When he arrived, much of its business was tied up with the declining men's suit trade, as one of the leading suppliers of woven filament fabric linings to the big made-to-measure groups.

Dr. Blackburn took the carpet industry by surprise soon after arriving by acquiring from the Receiver the Rivington subsidiary of Bond Worth and he has since moved further into the carpet industry despite the problems of over-capacity with further acquisitions in Ireland and the UK.

The link with Yuki is meant primarily to fit in with moves Rivington Reed has been making to involve itself more deeply in fashion fabrics, in particular the more expensive ranges which UK garment makers are baying to buy from the Continent.

The group has moved into the manufacture of velvet through Dendle Fabrics and is using its expertise in the lining field to expand into manufacture of very fine woven textured polyester, a fabric now in strong demand.

Dr. Blackburn said he was hoping that Yuki, who is now British, but was trained as a textile engineer in the U.S. and Japan, would be bringing out ranges soon in Rivington Reed's velvet and in woven textured polyester.

Loans spur machine tool growth

BY HAZEL DUFFY, INDUSTRIAL CORRESPONDENT

THE FINAL tally of aid offered by the Government to the machine tool industry is £35.5m. Investment by the industry is expected to have increased substantially as a result of the scheme.

If all the projects on which aid has been offered were to materialise, the total investment by the industry with the help of Government will be nearly £176m. In practice, some projects are expected to be dropped or scaled down. But the Department of Industry is still budgeting for about £32m of aid to be taken up, against an allocation by Government of £30m.

John Brown group), the 600 Group, and Adcock-Shipley. The Department received 438 applications from the industry, of which 123 were rejected or were withdrawn by the companies.

The scheme, considered to be one of the most successful for aid to industry, was designed to promote investment in buildings, machinery and product development.

Companies seeking to rationalise production, or wanting the services of consultants, were also eligible.

In practice, plant and machinery and product development have proved the most attractive aspects of the scheme. Assistance towards investing in new machinery will total nearly £18m, resulting in investment of more than £91m, while some £14m has been offered towards product development projects totalling £38m.

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UK NEWS — LABOUR

Hospital and council staff may have similar deals

BY NICK GARNETT, LABOUR STAFF

A PAY OFFER similar to that which may be reached for local authority manual workers in the next few days is now seen by national union officials as a way out of both the hospital ancillary and ambulance men's disputes.

Council employers and union representatives met Mr. Peter Shore, the Environment Secretary tonight to discuss a self-financing productivity deal to give a modest topping-up above the 9 per cent offer on Friday.

Both sides meet again, possibly on Wednesday, for further discussions on productivity if today's meeting makes reasonable headway.

A large number of employers are doubtful if a productivity deal could be accurately gauged in terms of self-funding, but the unions believe a self-financing deal based on increased flexibility and improved efficiency can be devised immediately in double figures.

The local authority manuals have also been offered a pay comparability study which holds

out the possibility of more money in August and in the following April.

Union leaders are prepared to recommend the 9 per cent provided agreement is reached on productivity. If it is not reached, the offer is still likely to go out to the membership, but with no recommendation.

The Government proposes that the Standing Commission which would make a comparability study of local authority pay would be used for other public services.

National union officials involved in the health service dispute have already been told privately that they will also be offered 9 per cent.

If a productivity deal can be worked out for these groups, with the promise of a comparability study, the 9 per cent offer would almost certainly be recommended for acceptance.

It is unclear if that recommendation would be accepted by health service workers. A national conference of ambulance men's shop stewards,

at which there may be some indication on this point, meets tomorrow.

Further pay talks in the health service are expected within the next week.

A national conference of Transport and General Workers' Union delegates representing water industry workers at the weekend accepted a deal worth 16 per cent.

This follows a similar decision by members of the General and Municipal Workers' Union. The decision by members of the National Union of Public Employees will be known next Monday.

Mr. Frank Chapple, general secretary of the Electrical and Plumbing Trades Union, said yesterday that the activities of some pickets involved in the local authority dispute were no better than those of terrorists.

Paying particular groups of workers sizeable increases simply because they received so little would be disastrous for the country, he said.

Railway drivers' threat lifted

By Our Labour Staff

TRAIN DRIVERS in two of Southern Region's three divisions yesterday called off their unofficial one-day strike on Wednesday which would also have affected London's Underground services.

The decision to postpone any unofficial action until after March 15 was taken by local officials of ASLEF, the train drivers' union, representing depots in the south-eastern and central divisions.

Leaders of drivers in the south-western division, covering services to and from Waterloo meet today to vote Mr. Ray Buckton, the union's general secretary, last week appealed to the men to suspend industrial action while an independent tribunal prepares its report on national drivers' claim for a 10 per cent special responsibility payment.

Some union and British Rail officials are doubtful that the tribunal, whose hearing has now ended, can find a new ground on which a solution acceptable to all sides could be based.

Bid to prevent Dunlop closure

By Our Labour Staff

PROPOSALS to prevent the closure of Dunlop's Speke plant on Merseyside are likely to be drawn up today at a special union conference.

It will involve Mr. John Miller, Transport and General Workers' Union national secretary and national and local representatives of all unions at Dunlop. The idea is to resist threatened redundancies at two of the company's other plants.

Last week Mr. Miller and Mr. Moss Evans, the Transport Workers' general secretary, met Mr. John Smith, Secretary for Trade, about the problems caused by cheap European tyre imports.

Dunlop has blamed cheap imports and low productivity for the Speke closure, involving the loss of about 2,400 jobs.

Dunlop plans cuts at its Birmingham and Scottish plants with the loss of a further 750 jobs.

Civil Service pay unit findings to aid industrial worker's deal

BY PHILIP BASSETT, LABOUR STAFF

INDUSTRIAL civil servants, who caused political embarrassment in their pay campaign last year by blacking three of Britain's four nuclear submarines, will base negotiations for their July settlement on pay comparisons made by the white-collar Civil Service's pay research unit.

A settlement due in April for the 600,000 white-collar civil servants will be based on the unit's findings, which show rises due of 26.36 per cent for middle-ranking grades. Progress is being examined by union officials representing the 182,000 industrial workers.

Full results of a separate survey for the industrial workers are expected about May, but union officials are confident that comparisons with outside industry must show rises due of between 15 and 30 per cent.

Officials representing white and blue-collar civil servants have been regularly meeting jointly to chart the progress of the white-collar personnel's fight to win full implementation of

the unit's findings, in spite of the Government's 5 per cent limit.

Industrial workers regard the outcome of the white-collar negotiations, including the offer of a staged deal, as crucial to their settlement. The promise of a comparability settlement for this year's deal was central to last year's Government agreement with the unions on a 10 per cent deal to prevent repetition of embarrassing industrial action.

Last year, action included one-day strikes at naval dockyards and stoppages by House of Commons and Whitehall drivers, messengers and other staff.

The submarine's blacking had to be broken by the Navy. The Civil Service Department has provided the pay research unit with extra resources to deal with the industrial workers' comparability study.

The unit is drawing up its report on an agreed list of companies after visiting comparable jobs in oil and chemical engineering, ship-

building, marine engineering, construction, transport and distribution.

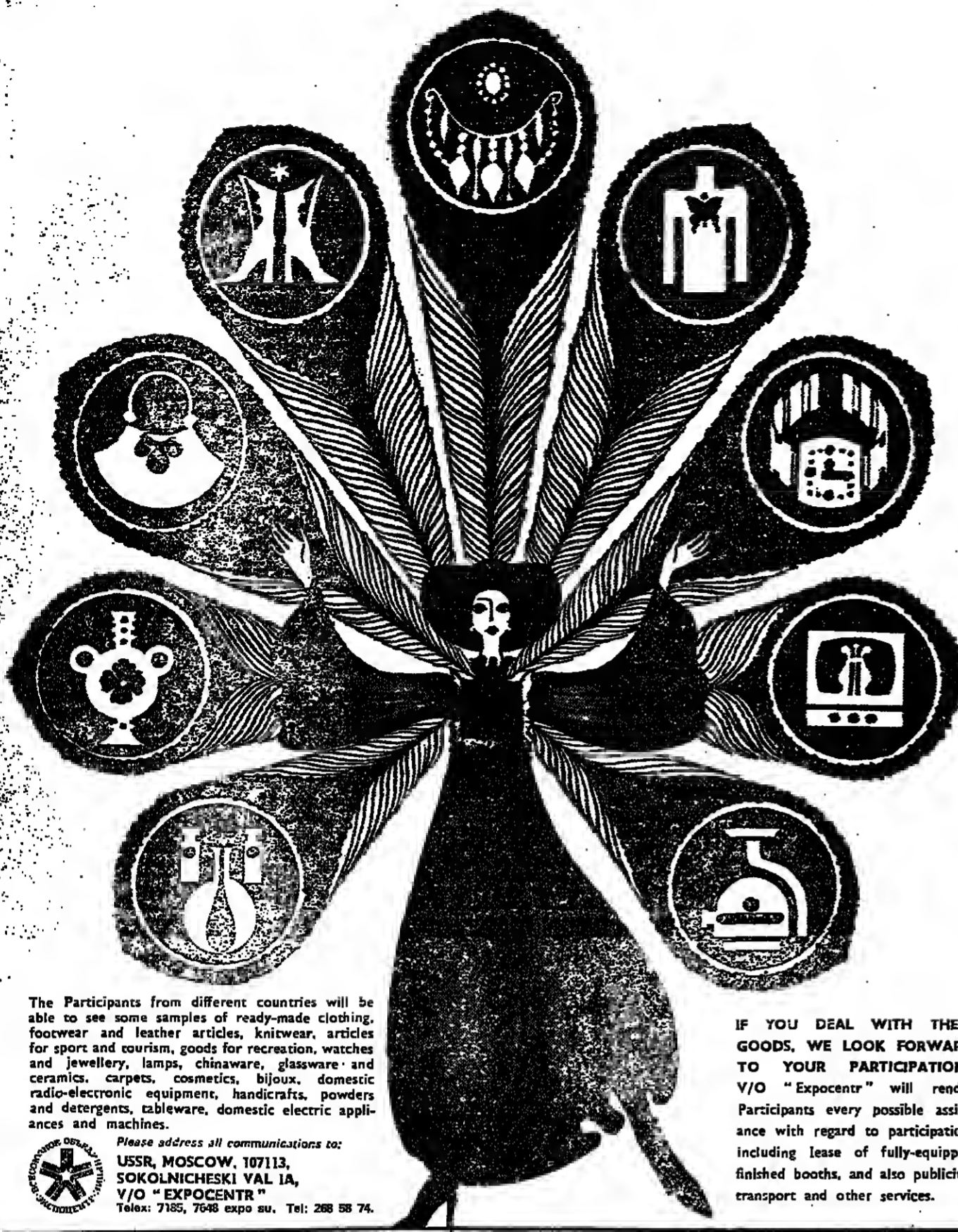
It is examining basic rates, overtime, holiday, shift and sick pay, productivity payments and the conditions to be met for productivity schemes, piecework, measured day work and other factors.

Journalists told to quit rented flats

JOURNALISTS SACKED by the Nottingham Evening Post have been told to quit their rented homes within 28 days.

The Post sacked 28 National Union of Journalists members for taking part in the recent provincial journalists' strike and six of them live in flats rented from the company.

The ultimatum came in solicitors' letters on behalf of T. Bailey Foreman, owners of the Post.



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Three-way competence. Teleprocessing networks represent one of the main axes of tomorrow's data processing. Their design and construction demand, as of now, expertise in three allied domains: advanced technologies, systems organization, and network architecture. At Cii Honeywell Bull we have been orienting our research towards future network developments for a long time. We understood early on that it was necessary to explore all advanced technologies — the only possible way to stay in front of the international competition.

Worldwide number 2 in data processing research. By reason of the technical coordination agreements which link them, Cii Honeywell Bull and Honeywell Information Systems Inc, rank number 2 worldwide in data processing research. Each year we devote more than 10% of consolidated revenue to research and development. Each year we file about 150 patents. Today, Cii Honeywell Bull is a leader in computer technologies. We have taken a considerable lead in the micro-electronic assembly technologies (micro-packaging) which make it possible to fully exploit the advantages of highly-integrated circuits.

Half of our research investments are, in fact, devoted to the development of software. In consequence, Cii Honeywell Bull is able to offer operating systems which are perfectly adapted to the specific needs of users. We are developing highly-evolved languages of the SIL type (System Implementation Language), on behalf of the United States Department of Defense, for example.

Systems architects. We are, as J.P. Brulé, Chairman of Cii Honeywell Bull, recently said, "data processing systems architects." This is as true for hardware/software optimization as for the design and implementation of teleprocessing systems. Our expertise in this extremely advanced field is proven. We have, for example, built the Swedish Social Security Administration's network, and that of the French assurance group, Mutuelle d'Assurance Artisanale de France, and the networks of many European banks.

Research and development investments (millions of French francs)

Year	Investment (millions of French francs)
1974	~100
1975	~150
1976	~200
1977	~250
1978	~300
1979	~350

We are convinced that, today, expertise in data processing means expertise in teleprocessing networks. System and network architectures are also a perfect illustration of our concept of "creative data processing": placing a practical, flexible and easy to use tool at the disposal of people and organizations to enable them to get the maximum benefits from their innovative and productive capacities.

Our growth, in figures. Cii Honeywell Bull's research and development policy, which guarantees its competitiveness in the international data processing market, has been rewarded by continued, balanced growth. At the financial level, our consolidated revenue increases by an average of 15% a year. Fifty-three per cent of consolidated revenue is earned outside our headquarters country, France, clearly demonstrating our success in international markets — an index of competitiveness. Our productivity per employee puts Cii Honeywell Bull in the first rank of data processing system manufacturers on a worldwide basis. Our net profit continues to grow, as does our cash flow (16.8% of consolidated revenue in 1976, 17.4% in 1977). And our debt/equity ratio of less than 1 (at the end of 1978) confirms the solidity of our balance sheet and provides us with the means for growth.

Continual expansion worldwide. At the marketing level, Cii Honeywell Bull is present now in 32 countries and its products are found in 67 countries on five continents. Our business, which originated in Europe, has spread to the rapidly-growing countries of South America, Africa and Asia. It is developing in the USSR, India and the People's Republic of China, countries which are among our priorities for market expansion.

Consolidated revenue (millions of French francs)

Year	Revenue (millions of French francs)
1974	~1000
1975	~1500
1976	~2000
1977	~2500
1978	~3000
1979	~3500

Productivity: consolidated revenue per employee (thousands of French francs)

Year	Productivity (thousands of French francs)
1974	~100
1975	~150
1976	~200
1977	~250
1978	~300
1979	~350

Furthermore, our association with Honeywell Information Systems Inc. gives us access to the American market — the biggest and toughest in the world. The international success of our Level 64 systems is a significant case in point: out of nearly 1,500 orders for these systems to date, representing 18 million dollars in rental revenue per month, nearly a third came from the United States.

We have set ourselves the objective of being amongst the foremost worldwide in data processing by taking advantage of all the possibilities offered by a growing market. Ambitious, this may be; but it is also realistic. With its considerable financial, industrial and marketing resources, Cii Honeywell Bull has the means to do it.

Cii Honeywell Bull

Creative Data Processing

FT SURVEY OF CONSUMER CONFIDENCE

Support grows for wages freeze to beat inflation

BY DAVID CHURCHILL, CONSUMER AFFAIRS CORRESPONDENT

SUBSTANTIAL support for a wages freeze as a way of avoiding a return to a high level of inflation is disclosed in the Financial Times survey of consumer confidence published today.

The survey shows 46 per cent of consumers believe that the Government should impose a wages freeze, with 39 per cent against the idea, and 15 per cent undecided.

Most support for the idea of a wage freeze came from people aged 55 and above, as well as the majority of women. Less support came from people aged between 35 and 54, although at least four out of every ten from each group favoured a freeze.

There was little regional variation in support for a freeze, apart from London and the South where the majority in favour was the lowest at 4 per cent.

After last month's sharp rise in pessimism among the survey, the index of future confidence has improved slightly in February, its first significant increase since last August. However, the index is still well below its normal level for the past two years and only one in six of consumers surveyed expects an improvement in conditions over the next year.

The survey shows that while 16 per cent of consumers expect conditions to improve, some 38 per cent believe they will worsen. This gives an index of minus 22 per cent, compared with minus 27 per cent last month.

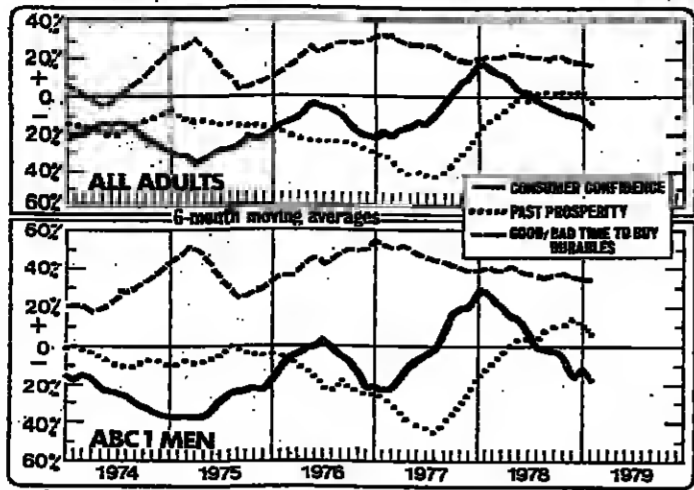
Pessimists

However, this slight improvement appears to be based mainly on the belief that the economic and industrial situation cannot get any worse. An increasing proportion are more hopeful for the future because of an expected change of government.

The pessimists in the survey, who are in the majority, mainly cite concern over the unions and strikes as the cause of their lack of future confidence. Pessimism over rising prices shows an 8 per cent rise, indicating concern over present levels of wage settlements.

Professional and executive men, from the ABCI social classification, do not share the slight improvement in future confidence, although women from the classification show the greatest rise in confidence.

According to age, the improvement in confidence has come almost entirely from the 35-54



age group, although the under 34's still remain the most optimistic of the age groups.

The slight improvement in the February index is insufficient to affect the six-monthly index which falls a further 4 per cent to minus 16 per cent.

Consumers' concern over the present situation has led to a sharp drop in the feeling that people are better-off than they were a year ago. Some 22 per cent of the survey felt better off than a year ago, while 39 per cent felt worse off. This gives an index of minus 17 per cent, compared to plus 1 per cent last month. The index of past prosperity is now at its lowest since November 1977 and only once previously—in July 1973—has the index changed more rapidly in a single month.

After four months at plus 2 per cent, the six-monthly index is down 4 per cent to minus 2 per cent. The "time to buy big things for the house" section of the

SALEROOM

Tiffany lamp: £75,000

BY ANTONY THORNCROFT

AN AUCTION record price for a Tiffany lamp of £75,000 was paid at Christie's in New York on Saturday in the most successful sale yet of works of art nouveau.

The price was more than twice the previous best for a Tiffany lamp. The auction totalled £384,757, way above the highest pre-sale estimate. The spider's web leaded glass lamp came from the "Quick

collection, assembly in the last 20 years. Another very rare lamp of the spider's web era sold for £82,500, while there was an auction record for a wisteria leaded lamp of £60,000.

Another record was the £9,500 for a Tiffany vase. Only one of the 90 lots was unsold in an auction which lifts prices of items from the celebrated New York maker to new heights.

The survey was carried out by the British Market Research Bureau for the Financial Times between February 1 and 7. A sample of 1,070 adults were interviewed.

WEEK'S FINANCIAL DIARY

The following is a record of the principal business and financial engagements during the week. The Board meetings are mainly for the purpose of considering dividends and official indications are not always available whether dividends concerned are interims or finals. The sub-divisions shown below are based mainly on last year's timetable.

Table listing various company meetings, board meetings, and financial events for the week of February 19, 1979. Includes entries for Midland Bank, Northern Foods, and various industrial and financial institutions.

Parliamentary Diary

TODAY

COMMONS: Debate on first report of Procedure Committee 1977-78 with 1st to 8th reports of Procedure Committee 1978-77.

LORDS: Private Bills. Kiribati Independence Bill, second reading. Nurses, Midwives and Health Visitors Bill, second reading.

TOMORROW

COMMONS: Continuation of Monday's debate.

LORDS: Films Bill, committee stage. Legal Aid Bill, committee stage. National Land Fund Bill, committee stage. Public Lending Right Bill, committee stage. Ancient Monuments and Archaeological Areas Bill, committee stage. Short debate on treaty on strategic arms limitation.

SELECT COMMITTEES: Nationalised Industries, Subcommittee A. Subject: British Waterways Board. Witness: Mr. Peter Store. Environment Subcommittee, 4 pm.

WEDNESDAY

COMMONS: Northern Ireland Orders on routes amendment and judgments enforcement. Lords consolidation measure. Motion on EEC documents on Community Budget.

LORDS: Short debate on international parliamentary conference on population. Short debate on UN special assembly on disarmament. Criminal Evidence Bill, third reading.

SELECT COMMITTEES: Nationalised Industries, Subcommittee B. Subject: Report and Accounts of Electricity Council. Witness: Electricity Council. Room 8, 10.45 am. Science and Technology, Genetic Engineering Subcommittee. Subject: Genetic Engineering. Witness: Association of Uni-

versity Teachers. Room 15, 10 am. Expenditure, Environment Subcommittee. Subject: Re-development of London's Docklands. Witnesses: Bernard Thorpe and Partners, Nigel Spearing. MP. Room 5, 4.15 pm. Nationalised Industries, Subcommittee E. Subject: Ministers, Parliament and the Nationalised Industries. Witnesses: Nationalised Industries' Chairmen's Group. Room 8, 4 pm. Expenditure, Trade and Industry Subcommittee. Subject: UK domestic air fares. Witnesses: British Midland Airways, British Caledonian Airways. Room 16, 10.15 am. Expenditure, Social Services and Employment Subcommittee. Subject: Perinatal and neonatal mortality. Witnesses: Health Visitors' Association, Obstetric Anaesthetists Association. Room 6, 4.30 pm. Public Accounts committee. Subject: Appropriation accounts. Witnesses: Ministry of Agriculture, Intervention Board for Agricultural Produce. Room 16, 4.45 pm.

THURSDAY

COMMONS: Debate on White Paper on review of Mental Health Act.

LORDS: (Commencing 11 am) Films Bill, third reading. Social Security Bill, committee. House of Commons (Redistribution of Seats) Bill, committee. Motion on European Communities (Definition of Treaties) (ECSC decision on supplementary Revenues) Order. Rates Amendment (NI) Order. Conservation of Wild Creatures and Wild Plants (Amendment) Bill, report. Legal Aid Bill, third reading. Short debate on London airports.

FRIDAY

COMMONS: Private Members' Bills.

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Remember, if you come to Cumbria you will be living and working only minutes away from the Lake District National Park, among the finest scenery in Britain just another plus for Cumbria.

For further details please contact: Hub Childes, Industrial Promotion Officer, Cumbria County Council, The Courts, Carlisle, Cumbria.

Telephone Carlisle (02283) 25436



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reading. There's also a washroom where you can spruce up, ready to meet your client.

It sounds rather like your office, doesn't it?

Indeed, if your office is famous for its breakfasts and can also travel at speeds up to 125mph, there may be remarkably few practical differences between it and the train.



Have a good trip!

THE MANAGEMENT PAGE

EDITED BY CHRISTOPHER LORENZ

John Elliott looks at the likely impact of the introduction of tax concessions on shares for employees

Swelling tide of employee share schemes

ONE OF the more lasting effects of last year's political pact...

The official starting date for the concessions is now less than two months away...

The Finance Act's arrangements cover share handouts of up to £500 a year per employee...

Many people assumed, when these arrangements were passing through Parliament...

Companies like ICI, for example, are adapting existing share schemes...

outs. Others, such as Foster Brothers, are fashioning schemes to operate as self-financing productivity schemes.

The British Sugar Corporation is one company that is simply setting up a scheme to accommodate the personal savings of employees...

Up till now such forms of share ownership have played only a small part in British employee participation policies...

But the new tax changes have caught a tide that was beginning to swell in 1976 and 1977...

But new tax changes have caught a tide that was beginning to swell in 1976 and 1977...

Companies like ICI, for example, are adapting existing share schemes...

to the company for at least five years.

ICI's scheme is one of the oldest in the UK. It was introduced in 1953 and was partly responsible for giving such arrangements a bad name.

Following modifications introduced at ICI last year, the amount of money allocated is related to a value added assessment of the company's profits.

Now the scheme has been changed so that employees can choose each year whether to opt for these old style taxed shares...

Another concern adapting its earlier arrangements is Lloyds

Bank which introduced a mixed cash handout and share scheme a year ago for those of its 42,000 employees with more than five years service.

It is expected that about 85 per cent of the employees will take the cash handout while those above received shares...

Yet another sort of scheme has been introduced by Foster Brothers Clothing for its 4,000 employees in shops, warehouses and factories.

When the Finance Act emerged, the scheme was redesigned. But it still retains a large, taxable, cash element.

Since Foster has a lot of part-



company's management believes that the availability of cash will help boost the day-to-day productivity aspect of the scheme...

The size of the overall bonus is calculated according to a formula embracing a value added assessment of productivity, the company's profit, and its employee costs.

Because of its cash element, this Foster scheme has had to be vetted by the Department of Employment's incomes policy division...

time workers, it has opened its scheme to all full-timers and part-timers doing 16 or more hours a week who have worked for the company for a full year.

Part-timers working eight to 15 hours weekly qualify after they have been employed for five years.

While schemes like Foster's ICI's and Lloyds Bank's provide choices for their employees,

to keep the arrangements, it has agreed even though the pay policy is currently breaking down.

Second, schemes such as ICI's which include other share and cash options that were introduced before the current phases of pay policy began are also exempted...

While schemes like Foster's ICI's and Lloyds Bank's provide choices for their employees,

some companies are designing or adapting schemes which do not include a cash alternative.

For example both the House of Fraser and Sainsbury have schemes whereby employees are issued with an allocation of shares.

Yet another type of scheme is a savings plan which is popular in the US where profit-sharing schemes are often linked with pension arrangements.

So it can be seen that a wide variety of schemes are being introduced to meet the different traditions, management styles, financial needs, and bonus arrangements of different companies.

What is already clear is that the tax changes have helped to start a new trend in profit sharing.

SHOULD Europeans and Americans who visit or work in the Arab world bother to learn Arabic?

Obviously there are some people — diplomats and commercial bank managers, for example — who have to be fully aware of what is going on around them, and need to speak and read Arabic fluently to do their job.

But most businessmen and other people visiting or even based in the Arab world can present a reasonable argument for not learning it.

British diplomats spend a solid 16 months at their special school, and even then few are said to be totally fluent in it.

seem to help. I wanted a course that taught the rudiments of colloquial Arabic explained the basic grammar, taught a vocabulary and supplied a teacher whom one could question till one understood.

But having visited Arab countries for two or three months each year for the past few years for the Financial Times, I felt increasingly foolish knowing almost no words of Arabic.

course, run three or four times a year for £190 by the School of Oriental and African Studies in London.

There were two classes of 12 people, composed predominantly of sales managers with a sprinkling of bankers and consultants.

Should you learn to speak Arabic?

course, run three or four times a year for £190 by the School of Oriental and African Studies in London. The advance instructions said dauntingly that no English would be used in introducing new material, that lessons would continue late into the night (the course was residential) and that I was to bring a tape recorder with which to listen to cassettes of what I should have learnt, after lights out, so to speak.

telephone to handling a crude 'Who are you, where do you live and what do you do' conversation.

I came away reeling, with phrases and the gestures associated with them, racing through my mind, overwhelmed by the amount of material thrown at me and clutching two cassettes and a notebook of all I should have learnt.

ally being able to get the drift of simple Arabic conversations going on around me.

Details of the course referred to from: Extrajural Division School of Oriental and African Studies, Malet Street, London, W.C.2. James Buxton.

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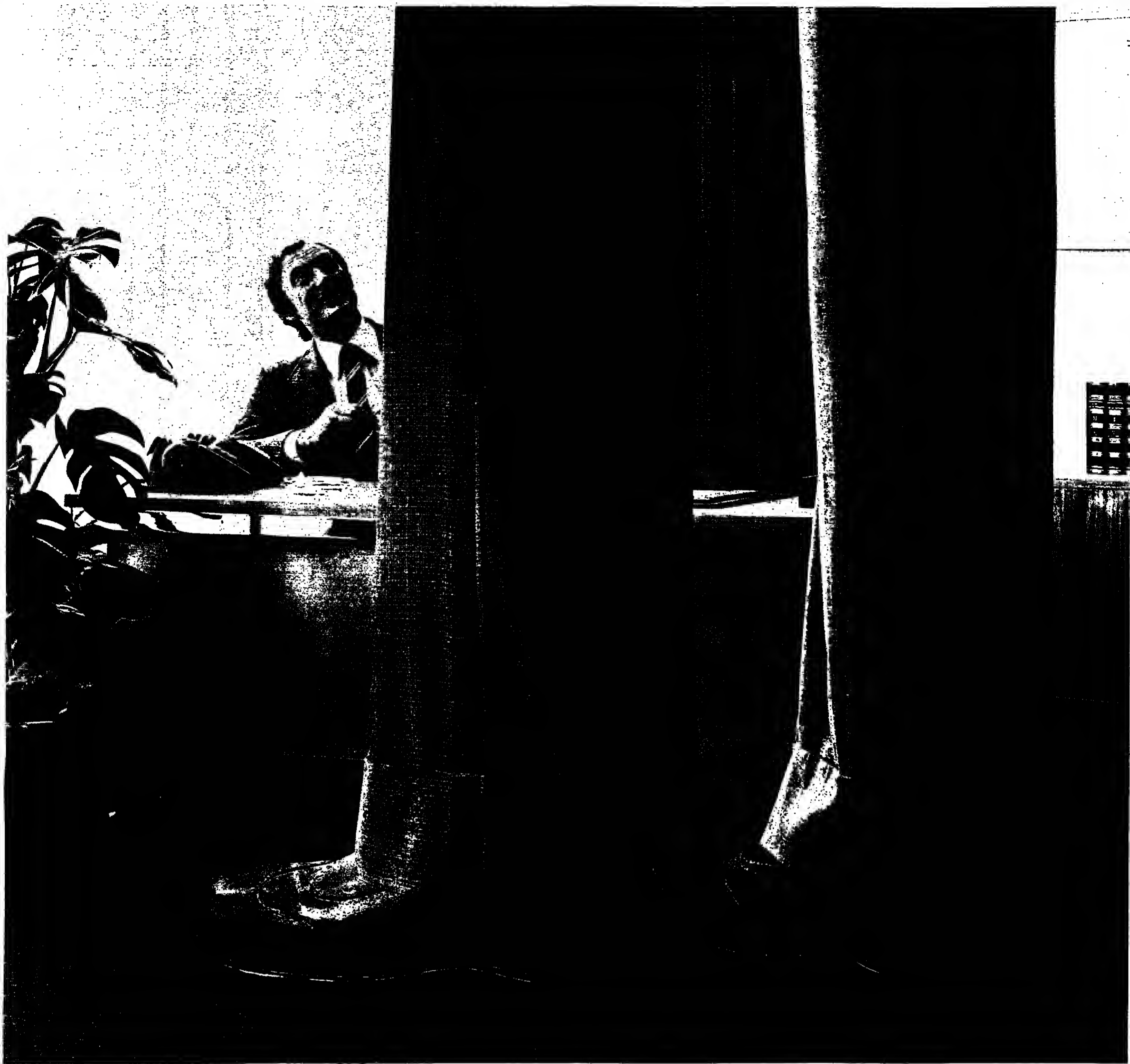
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Development Loan to take care of that. Longer term financial requirements are no problem either as NatWest own a Merchant Bank, County Bank.

And short-term money based on your debtors can be arranged through Credit Factoring International. If your business could do with some financial inspiration, ask your local NatWest bank manager. He'd like that.

Just ask him.



THE ARTS

St. John's, Smith Square

Operatic Shakespeare

by NICHOLAS KENYON

A not altogether appropriate title for Mrs Nova's fascinating concert on Saturday... Operatic Shakespeare... by NICHOLAS KENYON

Wigmore Hall

Music at Court

by NICHOLAS KENYON

The Academy of Ancient Music is the latest ensemble to set off on the nationwide Early Music Network... Music at Court... by NICHOLAS KENYON

Rare play at the Royal Court

As part of the policy to revive neglected plays as well as to present new ones, the Royal Court will present The London Cuckolds by Edward Ravenscroft... Rare play at the Royal Court

RUGBY BY PETER ROBBINS

Has J P R Williams had his day?

WALES AND FRANCE have dominated the home rugby scene for so long that the match between them almost invariably settles the championship... Has J P R Williams had his day?



Shope Shodeinde and Malcolm Fredericks

Bush

Independence

by B. A. YOUNG

Once upon a time there were two West Indians who lived in a newly independent Caribbean island... Independence... by B. A. YOUNG

Festival Hall

Curzon and Slatkin

by DOMINIC GILL

The Royal Philharmonic Orchestra's concert under the baton of Leonard Slatkin... Curzon and Slatkin... by DOMINIC GILL

New members for literature advisory panel

The Arts Council has appointed four new members to its literature advisory panel... New members for literature advisory panel

The Susan Smith Blackburn Prize

The first annual Susan Smith Blackburn Prize has been awarded in London to Mary O'Malley for her play Once a Catholic... The Susan Smith Blackburn Prize

American radio

Disco dominates the air waves

by FRANK LIPSUIS

What attaché cases are to one segment of New York society large transistor-cassette machines are to another... Disco dominates the air waves... by FRANK LIPSUIS



The Bee Gees

Angry collector will sell abroad

MR. DENIS MAHON, owner of a famous collection of Italian 17th-century paintings, has decided that on his death it should be sold abroad... Angry collector will sell abroad

Danger, said: "This causes us the greatest possible concern... More talks today on plan for student fees change... 'Sex bias' in airline's job offer

More talks today on plan for student fees change

BY MICHAEL DIXON, EDUCATION CORRESPONDENT

THE GOVERNMENT'S scheme to make students' unions more accountable for their £13m income from taxpayers' funds enters a new stage of negotiations in London today... More talks today on plan for student fees change

'Sex bias' in airline's job offer

A HOLIDAY airline's hunt for a top executive was "tainted" by sex discrimination... 'Sex bias' in airline's job offer

Peking's great gamble in Vietnam

Changing the House

THE HOUSE OF Commons today begins a two day debate on its own procedure. The starting point is the Report from the Select Committee on Procedure produced as long ago as last August...

Broad spectrum The Procedure Committee would never have been set up if there had not been fairly widespread dissatisfaction among back bench MPs...

Deference Its basic recommendation is for the extension of the Committee system so that every major government department is watched by a Parliamentary committee...

Testing French steel THE PROBLEMS of the French steel industry, now causing serious labour unrest in the Lille region and Lorraine, are by no means unique...

Testing French steel

Local impact Other points of the Government's case are more familiar. The steel industry, indeed French industry as a whole, it says, cannot remain competitive in today's changed international economic circumstances without major surgery...

Six months M. Giscard d'Estaing still has time on his side. The next Presidential election is not until 1981. For his part, he is confident that direct elections will strengthen his power...

Sovereignty The dangers are all the greater in that while the problems of the steel industry are common to many countries, the nature of protests in France is not. Violent street demonstrations are part of the country's

CHINA HAS taken an enormous gamble in Vietnam, risking at one and the same time that the Russians will be tempted to retaliate, and that the West will allow its new friendship for Peking to cool...

The full reaction by the Soviet Union remains to be seen, but Moscow is bound by the Treaty of Friendship with Vietnam, signed last summer, which includes a clause on defence...

IMPERIAL CHINESE rulers who occupied Vietnam for 1,000 years and made repeated attempts to annex Vietnam in the last 900 years have been replaced by a Communist Party...

In fact over the last two months Hanoi's domestic propaganda has stressed this continuity of history to explain the conflict as well as to boost the country's morale...

This simplistic historical explanation, however, only touches a part of the conflict. During the Vietnam war involving the Americans, Hanoi's relations with China were claimed

so although they are outgunned by the Russians they are certainly not unprepared. The Chinese have imperilled their new relationship with the West by rousing latent anxieties...

Cold water on new warmth The Chinese move will certainly pour cold water on the new warmth between Chinese and Americans that Vice-Premier Deng's recent visit to the U.S. engendered...

As seen in Moscow and Hong Kong conflict with Vietnam. Hanoi also felt that despite the numerical superiority of the Chinese army, it is a flabby and poor fighting force...

Under those circumstances, the worst the Soviets might do would be to instigate a few border incidents. The rivers which divide the Soviet Union and China are full of disputed islands...

The Friendship Treaty obliges the parties to consult in the event of a threat or attack

to be a swift surgical strike against Vietnamese border posts and towns, taking only a few days. However, given the hilly country of the border area...

Most of the Vietnamese army is at present supporting the new leadership of Heng Samrin in the Cambodian capital, Phnom Penh. It was set up early this year after Cambodian rebel forces, strongly supported by the Vietnamese, had invaded and expelled the previous Pol Pot leadership...

Colina McDougall

MEN AND MATTERS

The old block about new chips If there is one attitude which many British company directors share with trade union leaders, it is a deep suspicion of the silicon chip...

Open house On the principle, it seems, that every home should have one, the Open University will be soliciting for students at the forthcoming Ideal Home Exhibition...

Past discounted When Union Discount moves back this morning into its Cornhill home after a 53m four-year refurbishment it will be saying goodbye to the quill pen era...

Brotherly advice This pungent piece of graffiti has been reported from a Birmingham factory: "More haste, less overtime."

All at sea A Malta conference, costing about £1m, has run into a storm over the amount the host country is willing to pay its own staff...

Taking and paying Sir Keith Joseph's favourite proverb is Polish, so he says. This is how it goes: "Take what you like," said God. "Take it and pay for it," intriguingly enough, it is also the favourite quotation of Mrs. Shirley Williams, the Education Minister...

Managing director at Union, explains that it is a basic revolution to introduce video terminals into their operations. The market has changed tremendously in the past five years, he says. "So we are keeping up with the game."

Observing Sir Keith Joseph's favourite proverb is Polish, so he says. This is how it goes: "Take what you like," said God. "Take it and pay for it," intriguingly enough, it is also the favourite quotation of Mrs. Shirley Williams...

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FINANCIAL TIMES SURVEY

Monday February 19 1979

Networks making a big impact

By Max Wilkinson

THE POLITICAL mind, confronted with the idea that computer networks can be a substitute for roads, is likely to experience an understandable giddiness.

However, it is a serious idea which is being put forward increasingly by analysts of computer technology; and it is not particularly visionary. The Americans have even coined a portmanteau word for this fusion of computing and communications technology, "comunications," which would have delighted Lewis Carroll. The term is perhaps too odd to survive in Europe, but the ideas behind it are taking root fast. The fusion is, indeed, expected to bring revolutionary changes in the way people do business within a few years.

A major report on data processing published last year by the French Government ("L'Informatisation de la société") coined its own special term telematique to describe the phenomenon.

In Britain, however, the political discovery of the micro-processor and its potential significance has tended to divert public attention from this other trend which, in the long term, could have a much more profound significance—the development of cheap communications between cheap computers. Certainly the production of mass-produced micro-electronic circuits will be one of the major elements causing the reduction of costs, but even the most complex of these miniature circuits will be only the building blocks of much more impressive structures.

By itself the idea of wiring up computers to enable them to communicate with each other is not novel. The importance lies

in the reduction of costs which will put the equipment and services within the scope of a wide range of businesses. Indeed, computer networks are already beginning to change business practices and to make their impact on society as a whole. Indeed, Mr. James Martin, a former IBM engineer, and now one of the best known writers on computer networks, points out in his book "The Wired Society" that the acceptance of computer networks will depend to a considerable extent on the price of oil.

Exchange

The reason is that a large proportion of the world's consumption of petroleum is used in transporting people who simply want to exchange information. Much of this communication could be delivered, in one way or another, in the form of computer data, particularly where face-to-face confrontation is not essential. Executives often have to travel to a particular office merely to gain access to files, for example. If the files were all stored on a computer network which could be inspected through the telephone system, travelling could be reduced and meetings of a routine character cut down. Already in the U.S. the networks for carrying computer

data, particularly Telenet, are posing a challenge to the physical transport of surface mail, since large sections of business communications can be put in the form of computer data and shifted around the country quickly and cheaply.

Competition will be intensified by the new satellite services, particularly the U.S. satellite Business Systems network which is jointly owned by IBM, Comsat and Aetna Casualty and Surety. It has received a licence from the Federal Communications Commission to offer leased data communications channels over the U.S. continent starting in 1981. This venture and others projected by companies such as Xerox and ITT have important implications for the whole communications and computing industry in the U.S. and in the rest of the world.

M. Simon Nora and M. Alain Minc, authors of "L'informatisation de la société" comment: "Their power and universality, accessibility and transmission range will make communications satellites the 'imperial highways' of the future. If IBM dominated satellite transmissions the company would transcend the role of a mere manufacturer; willingly or unwittingly, it would participate in world government. It has everything to become one of the great

world regulatory agencies."

By the mid-1980s a new generation of much more powerful satellites is likely to be available, capable of transmitting television programmes direct to rooftop receiving dishes across large sections of the world. These big satellites could just as easily be used for sending vast quantities of data which could be received in a similar way. Since any large company could easily put up a receiving antenna, the system poses a significant threat to the current monopolies of all the present telecommunications authorities (PTTs) in Europe as well as in the U.S.

Consequence

The expected consequence is that data communications will become much cheaper. The analysts of SBS Publishing, of San José, California, for example, predict that the cost of digital communications will be reduced by a factor of 10 in the second half of the 1980s. At the same time local links will be greatly improved by the use of modern high-capacity lines including optical fibres (hair-thin threads of glass which carry information in the form of a high-intensity pulsating light).

The advantages of trans-

continental and transatlantic satellite links clearly will be seized first by the larger multinational companies, which will use them as main arteries for internal communication. However, the same principles apply to systems used by much smaller companies for a computer network all in one building can function in just the same way as if each of the different machines were thousands of miles apart. The main point is that networks are becoming more important than machines.

The reason is that the continual fall in the cost of computing (at about 20 to 30 per cent a year) is making the economics of small local processors increasingly attractive. This is a reversal of the trend of the 1960s when all computing functions tended to be concentrated in a single department based on a relatively expensive large computer.

To cope with many different types of computing task, a batch system was used. For example, all payroll accounts would be processed together, at a particular time in the week. Other batches of work would be processed all in regular order. The result was a rather cumbersome series of systems for entering and organising data to suit the convenience of the computer's schedule.

Batch processing is still commonly used, especially in large computer installations, but it has often put considerable strain on company organisation. It is therefore tending to be replaced by inherently more flexible systems of "real time" or "on line" processing. The difference is that in a real time system new data can be entered into any of the computer files at any moment instead of having to queue up until the next relevant batch is being fed into the machine. Similarly, any of the files can be inspected at any time by means of a number of different terminals all operating simultaneously. The best known example of real time computing is the airline booking system, which carries an always up-to-date list of available seats. The control computer files can be altered and reviewed by hundreds of different terminals in booking offices all over the world. The airline system is therefore an example of a distributed network which depends upon extensive data communications for one of its main functions. Similar systems are used in banking and many other businesses which depend on the transmission of detailed up-to-the-minute data.

In the next decade many much smaller companies will

start to use such systems as they become cheaper to use.

One clear implication for the \$30bn world computer industry is that the emphasis of the market will continue to shift from large machines to terminals (particularly so-called "intelligent terminals" which include some computing power) and towards small communicating computers.

Already peripherals (including magnetic memory storage) and terminals account for nearly 45 per cent of the industry's sales, and represent twice as much as all the sales of large mainframe computers. Sales of mainframes themselves represent only about a quarter of the industry's total revenues, a proportion which will almost certainly decline in the next ten years.

The traditional distinctions between mainframe computers, mini computers, terminals and micro-computers are, in any case, becoming more misleading than helpful. The point can be illustrated by a forecast from Dicho Research that by 1990 a computer processor will be available which has 25 times the power of an IBM 370/168, (one of the largest) but costs only the same amount. Or to put it another way, small terminals will be able to include the same power as one of today's larger

computers at only a very small extra cost.

The clear implication is that computing devices will become extremely widespread and, paradoxically unimportant. The mere processing of data will be taken for granted, because it will become a cheap and widely distributed part of a system. Much more importance will be attached to the characteristics and purposes of the networks communications links and the terminals used to gain access to them.

Emphasis

The emphasis on intelligent terminals can be seen from the fact that the world's largest civilian computing network, the General Electric GEISCO service, has recently offered intelligent terminals to its customers. Even though the network of 150 large computers linked by satellite is more than capable of carrying out any processing required by the customer, it has been found that many tasks can be performed more economically by a small local processor.

More complicated processing, which might involve data stored on different sides of the Atlantic, would, however, be performed by the GEISCO Mark 3 service which the local processor can plug into using an ordinary telephone connection.

Local terminals in more general networks will not merely carry out processing on their own they will also carry out the important task of compressing text into the pulses of computer language. When so compressed the text can be sent, perhaps at night, to a similar machine. This will store the electronic information in the blink of an eye and then type it out at leisure.

Such "electronic mail" requires a computer network's communications, but uses only a minimum of computation.

This kind of application is predicted to grow rapidly, if only because companies already use computers for their more complicated data processing needs. The challenge of the next few years is therefore to make computer systems "friendly" and easy to use in order to spread cheaper and cheaper machines across ever-widening markets. And to prepare for the day when computers in some form or other will be as common as telephones.

Olivetti Systems. Intelligent enough to work on their own. Adaptable enough to join any network.

There's a new breed of distributed data processing systems. It comes from Olivetti.

Over 91,000 new Olivetti A5, A6, A7 and TC800 systems have been sold worldwide, spearheading the drive to data devolution.

Their programmability permits them to work independently or to integrate easily with any mainframe computer.

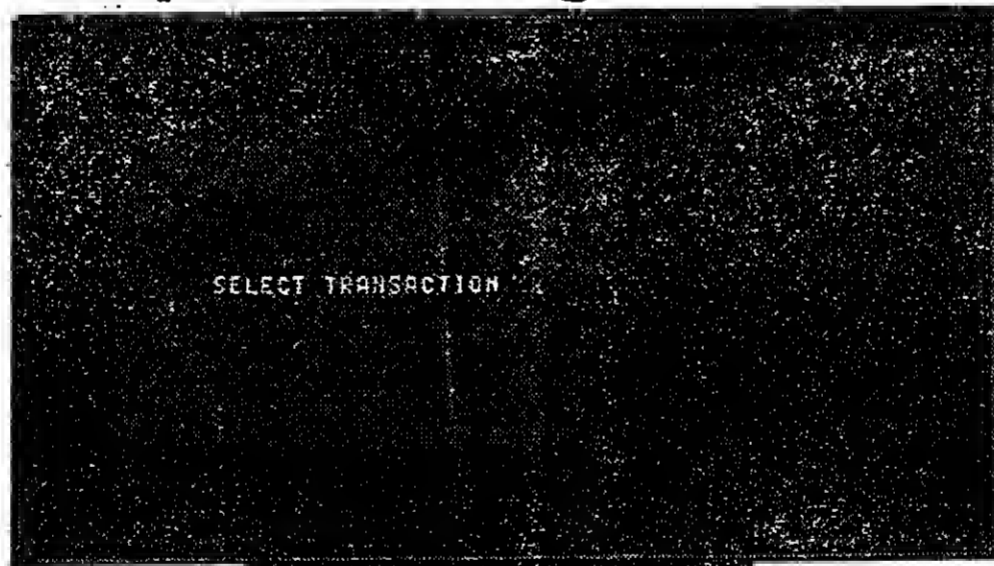
Their modularity allows enlargement of existing teleprocessing networks.

One of the Olivetti distributed processing systems is the TC800, an intelligent modular terminal system with a difference.

It can be configured to cope with most of the jobs previously the preserve of larger and more costly computer systems. And it can switch roles from hour to hour, the system adapting to the people who use it.

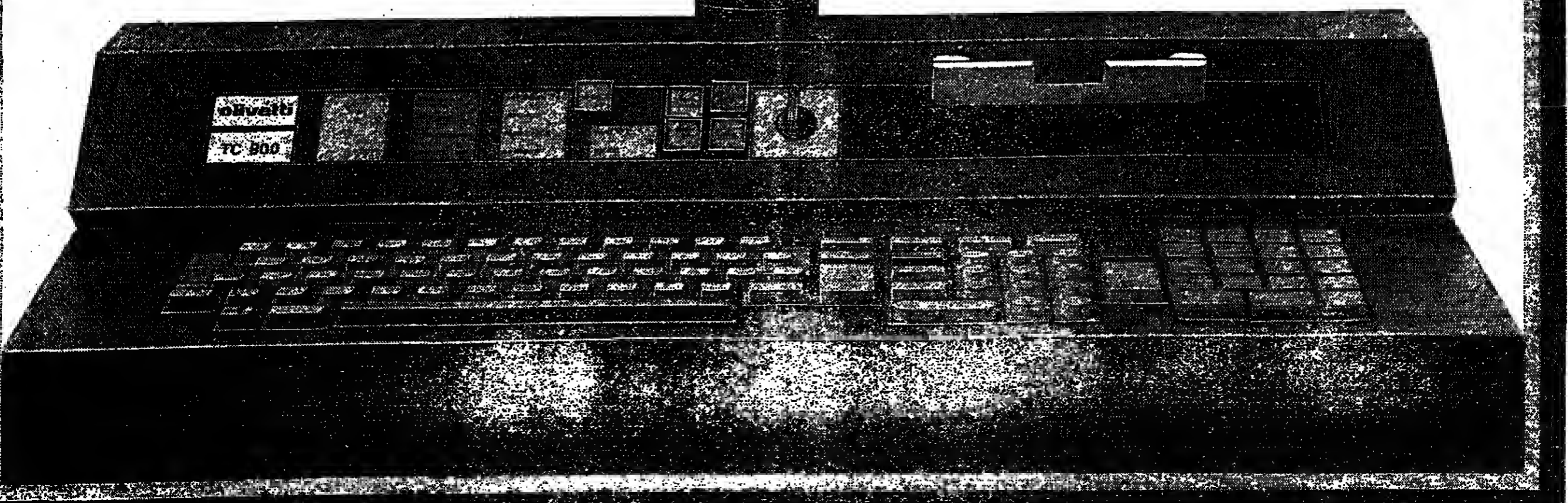
All of which has already made the TC800 the ideal intelligent terminal system for finance, government and industry.

Olivetti has installed throughout the world over 80,000 terminals and 180,000 systems for data and word processing applications, over 165,000 teleprinters and 330,000 accounting machines.



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THE COMPUTER INDUSTRY III

Encouraging growth projections

IN TERMS OF international trade, Europe is easily the largest market for computer equipment, partly because of trading between the separate countries of Europe, but also because of the very large imports from the U.S.

United Nations figures for 1976, the latest available, show that in computer and office equipment total imports by European countries was almost \$6bn or 56 per cent of the total of world trade in that year. Total exports by European countries were just over \$5bn, which implies net imports of about \$1bn.

The figures show that France is the largest importer at

\$1,200bn compared with exports of \$558m. Germany came second with imports of \$1,181bn compared with exports of \$1,640bn and the UK third with imports of \$978m against exports of \$925m. Italy had imports of \$580m and exports of \$568m.

Analysis of the figures by 21st Century Research, the U.S. analyst, shows that the U.S. exports 26 per cent of the world trade followed by West Germany with 16 per cent, Japan with 9.6 per cent, the UK with 8.8 per cent and then France with 8.2 per cent.

It is worth comparing these figures with the often quoted fact that IBM alone has some

80 per cent of the world market for computers and that the American companies together account for about 78 per cent of the world market. This obviously reflects the fact that America is by far the largest market for computers and with about 46 per cent of the total 189,000 systems installed throughout the world (in 1976). However, it should also be remembered that most of the U.S. companies, particularly IBM, manufacture throughout the world, so that world trade figures do not adequately reflect the dominance of American systems technology.

Worldwide, the total computer market is estimated by the U.S.

consultants Arthur D. Little (ADL) to have been \$18bn in 1978. They expect a real growth of 40 per cent over the next five years, with the largest thrust in smaller systems. When the associated revenues from software, terminals, services and office systems are included, total revenues are estimated at \$28.4bn in 1978, a 19 per cent increase compared with 1977. The previous trend for revenue to be derived more from services than from hardware is expected to continue until, by 1983, the split will be about 50/50.

By 1983, ADL expects annual shipments of the U.S. mainframe suppliers to be between \$25bn

and \$29.5bn. The growth rate of small computer systems in the price range \$20,000 to \$250,000 is expected to be relatively much faster than for the large mainframe, with a doubling of shipments by 1983 both in the U.S. and elsewhere. One of the main reasons for the expected growth in small systems is the emergence of a new generation of equipment which is versatile enough to be used on its own or to be booked up into a large network of systems. Small computers are therefore expected to find a market both among small-sized companies as well as with the big users.

For the large systems, costing more than \$1m, a growth of

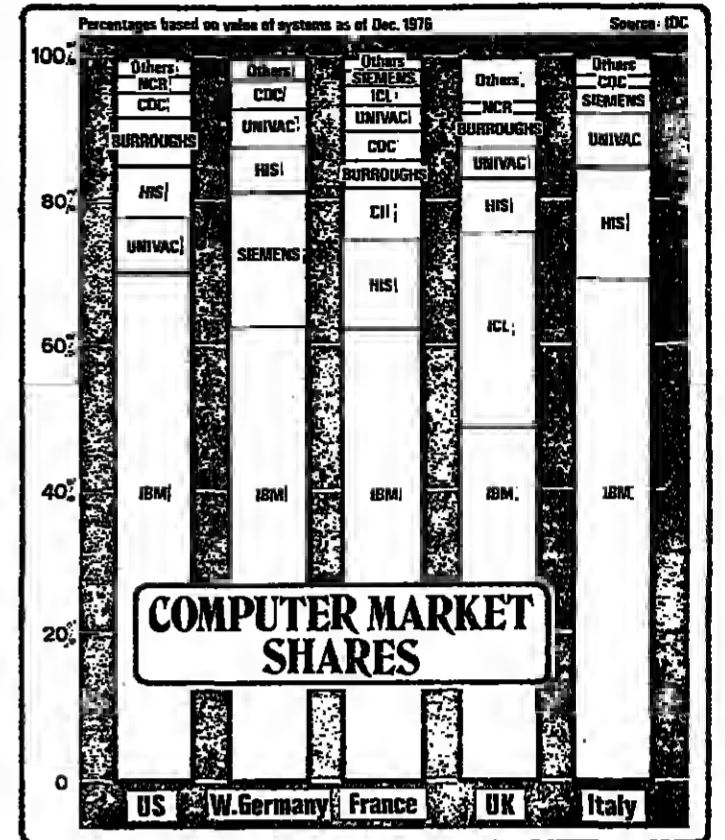
about 50 per cent is expected over the next five years from the 1978 shipments estimated at about \$8bn. A continued increase in the market for IBM's plug-compatible equipment is expected beyond the 1978 figure of \$650m which represented about 3.6 per cent of the world-wide total computer sales.

In 1979 the general outlook of the industry is buoyant in spite of signs of an impending recession in other industrial sectors. A growth of between 15 and 20 per cent is being predicted within the mainframe industry against the 12 to 15 per cent in recent years.

The companies producing small computers led by Digital Equipment Corporation (DEC) are talking of growth of perhaps 25 per cent to 30 per cent, which may represent a slight slowing down from the explosive rate of the last few years, but is, of course, growth from a continually widening base.

IBM, the barometer of the whole industry, reflected the general optimism among the big seven companies with revenues of more than \$1bn has increased its capital expenditure over the \$3.4bn spent in 1977, opened two new factories in the U.S. and increased employment by 12,000 people in the first nine months of the year. IBM's revenue for 1978 increased by 16 per cent to \$2bn with earnings up 14 per cent to \$3.1bn. Honeywell, the seventh largest company, in terms of data processing sales, increased total revenue 21 per cent to \$3.5bn, although only a proportion of that was accounted for by data processing revenues.

In reviewing the world's markets the two great uncertainties are the potential for selling computer systems to China and to the Soviet bloc. It is clear that China could represent an enormous market, and it has been taking an intense interest in all the major systems available. On the other hand, it is probable that it will want to manufacture as much as possible within China. The needs of China are still as uncertain as the political pressure in the West which may well build up feeling against exports of such a sensitive product to a Communist country. Similar considerations apply to the Soviet Union. The joint development of the ES series of computers by the seven Comecon countries is



Service bureaux expertise

NOT ENOUGH attention has been paid in the past by Government to the work of the computer service industry, with the result that there now remains only one independent service bureau which is completely free of transatlantic trammels. It is CMG, which, unlike most of its peers, is not an affiliate of a much bigger UK or U.S. group.

Yet the service industry is a very large sector of effort in its own right with last year's total turnover probably well over the £300m mark, a significant figure even when compared to total sales of computer equipment in the UK in 1978 at £780m or thereabouts.

Rate of expansion of the industry is about 20 per cent annually, which will take it well over the £1bn mark by 1985.

Within the service industry, consultancy and software expertise sales are not easy to determine from Department of Industry breakdowns. An approximate figure would be about £10m for consultancy in 1978, with possibly the same for software work. The complication arises because it is not possible to differentiate completely between work done by bureaux for the major groups that own

them and operations on behalf of outside clients. This situation may not last, however, if the largest bureaux, like UCSL and BOC Datasolve, continue to move from strength to strength.

Within the past year or so, Government has become aware of the fact that the nebulous thing called "software" is indeed a most important commodity, though it can neither be patented nor trademarked with any success. It took 10 years for the industry to teach the pursestring holders that just as every car has an instruction manual for drivers, so must every computer have sets of operating instructions, both for the physical operator and the electronic controller inside the machine.

Another fact that took a long time to drive home was that in Britain, with its long tradition of engineering problem-solving there was a particular aptitude for software work that needed to be fostered and turned into an exportable asset. IBM, Honeywell and Univac recognised that fact long ago. So did the French makers seven years ago when the French Commercial Counsellor spent nearly two years fostering links between leading UK and French software groups.

At last we now have Inscac, formed under the wing of NEB and joining CAP, Logica and SPL International in a loose confederation where Inscac acts somewhat like an international broker for software products, for which it recognises a need and a market, commissioning them from one or other of the members as it sees fit.

Its first big step has been to sign an agreement with the well-known Calcomp organisation in the U.S. to provide at least 15 applications routines for Calcomp's existing and novel graphics equipment.

Leader

Calcomp is world leader in this area of computer-controlled devices by a long way and has just extirpated itself from financial problems resulting in part from extremely heavy development costs.

Inscac has entrusted the work to SPL and some idea of the importance assigned to it can be gained from the fact that, at Abingdon, SPL is installing a full IGS-500 interactive graphics system to carry it out.

Inscac is also undertaking world marketing of the real-time language RTL 2, developed originally from small computers

by ICL and supported by STL. The peculiarity of the situation is that a Government-backed body is helping to promote a privately developed and internationally known language in competition with the CORAL language developed within UK Government establishments, primarily for military use, but now being spread into industry.

What really could put Inscac on the map is the conclusion (long-awaited) of an agreement with the Post Office to market Viewdata in America. This will not be an easy task, even though Inscac is being aided as a consultant by Sam Fedida who invented Viewdata, and it is hard to understand why the Post Office hung back.

It is even harder to understand why the Inscac organisation tends to draw Conservative bullets, since it is operating primarily as a marketing organisation run by people who have been in the business for years. There can be no comparison with the high-risk operation that Inmos represents—with public funds at risk.

Before returning to considering bureaux it is important to note that with its new medium-scale computers, the 4300 series, IBM cut machine costs to the bone and put up soft-

ware fees sharply. Software prices charged by the company become an important part of the total cost of these machines which run from, say, £40,000 to £140,000, for a workable array.

Some competitors, including Irel and Hitachi, anticipated these moves several months ago and alternative major software entities have been written and tested. Initial reaction from most competitors is that the move is intended to make switching from existing IBM equipment much less attractive, in a particularly vulnerable section of that company's range. Bureau operators are lean and hungry men. They can teach most users and all manufacturers most useful lessons and take risks that the average user hedges at, simply because they know the equipment far better than most people. After all, if a bureau has to drop out a defective machine, it loses money and the goodwill of customers.

All the leaders of the big bureaux have an expertise which is not matched in any other area of the industry and it is some comfort to know that their advice is now frequently sought by Government.

Ted Schoeters

not keeping pace with the countries' needs for sophisticated computing. According to some Western experts the Soviet bloc is five to seven years behind the West in the development of computers and there is growing pressure to import hardware and know-how. However, trade of this nature is subject to the veto of Comcon, the U.S.-dominated committee set up to vet exports of strategic importance. Present indications are that trade will not be allowed to build up to a very significant level.

Otherwise, the main factors in world markets are likely to be the increasing protectionism within Europe the growing strength of European computer and semiconductor industries and the exporting ambitions of Japan. These factors will all tend to reduce the dominance of America on the world scene, but no very rapid change can be expected. Because users become easily locked in to a familiar supplier, the computer market has an inertia built into it which is quite unlike that for say ship-

building or steel. Market shares change only relatively slowly because users do not want to change a system once it is running without very good reason.

Within Europe government procurement policies will have to end by 1980 under present EEC policies, and it is still not clear whether a general European preference policy will be devised to replace it. This idea was recently suggested by Dr. Chris Wilson, managing director of International Computers Limited (ICLI), but has not so far received any general acceptance. One of the main problems facing any such preference scheme would be to define what is a European company, since many of the American companies including IBM and Honeywell, have large manufacturing plants in Europe.

Whereas, it is comparatively easy for an individual government to designate a chosen supplier, definition on a pan-European level would be much more difficult if not impossible.

Max Wilkinson

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With a clear eye on the future Honeywell is investing over \$200 million in 1979 on research and development for further advanced systems.

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Honeywell

THE COMPUTER INDUSTRY IV

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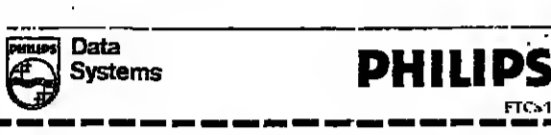
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THIS YEAR in Britain there will be a market for integrated electronic circuits, of which microprocessors are a sub-set, amounting to about £147m. Domestic production will reach £80m, comparatively little of that being micros.

In 1982, the total UK market for this section will have risen to £130m, or a gain of 20 per cent over three years—not what one could call a mad rush.

But as the imports of components in general have been rising steadily over the past several years at a rate of 15 per cent a year, it is very likely that imports will account for an even larger share of 1982 consumption than the 46 per cent or so for 1979. Half the 1982 market figure, or £90m, would be a good guess.

In 1978, UK computer imports exceeded exports by £150m. In 1977 the figures moved even more sharply into the red at £200m and for 1978, judging by the related statistics from Department of Industry which encompass the first half year, the computer industry deficit is likely to have been a staggering £300m. Go on like that and the 1982 shortfall could be £450m.

And where do we in Britain continue to fall down? Precisely where no real support or encouragement has been given by Government or any of its many arms—peripherals. Not to go into too much detail, the 1978 shortfall in this area is likely to have been £260m, very largely made up of ancillary pieces of equipment, or parts of equipment for peripherals manufacture, not precisely specified in Government figures.

This problem has not been tackled by Government and no amount of talk about microprocessors and their beneficial effects will have any influence on it at all. Overseas suppliers of these peripherals will build in—these are building in—micros as they see fit and if their use is justified, not because the DoI says they should.

Yet any computing system and most instrument systems based on micros need peripheral devices, or ancillary units of one sort or another to be of any use. Add the value of such ancillaries and the cost of making the whole array of equipment operate (programming) would generally lie between one hundred and one thousand times the value of the micro itself.

It is hardly surprising that Jim Bonnett in the influential "Green Sheet" says wryly that "never have so many politicians jumped on to so small a thing as a microchip, so late in the game."

He points out that the fear of job losses through automation has been with us since the 1950s and yet no great losses have materialised. On the contrary, where smaller businesses and industries are concerned, automation has tended to improve working conditions while creating new jobs in the user industries and with suppliers.

Vehicle for the Government drive is the National Enterprise Board which has chosen to back entirely new ventures in components by Immos and GEC-Fairchild while ignoring the fact that Ferranti has developed and is selling a perfectly adequate military micro, or that Plessey has a number of exportable memory products including bubble memories, as well as a significant development of a large biographic computer memory now under way.

What the chances are of the chosen two in the very tough world of the semi-conductor industry will come to later. Meanwhile, there is some doubt as to just how much is being put into the micro plans.

A recent scathing analysis by Kenneth Warren, MP, took apart the much-vaunted "£400m boost for micros" and discovered only £100m, additional to £135m already earmarked.

Of the latter sum, Immos receives £50m. The DoI's micro - processor Application Project (MAP) receives £15m and the Micro-electronic Industry Support Programme (MIPS) a further £70m.

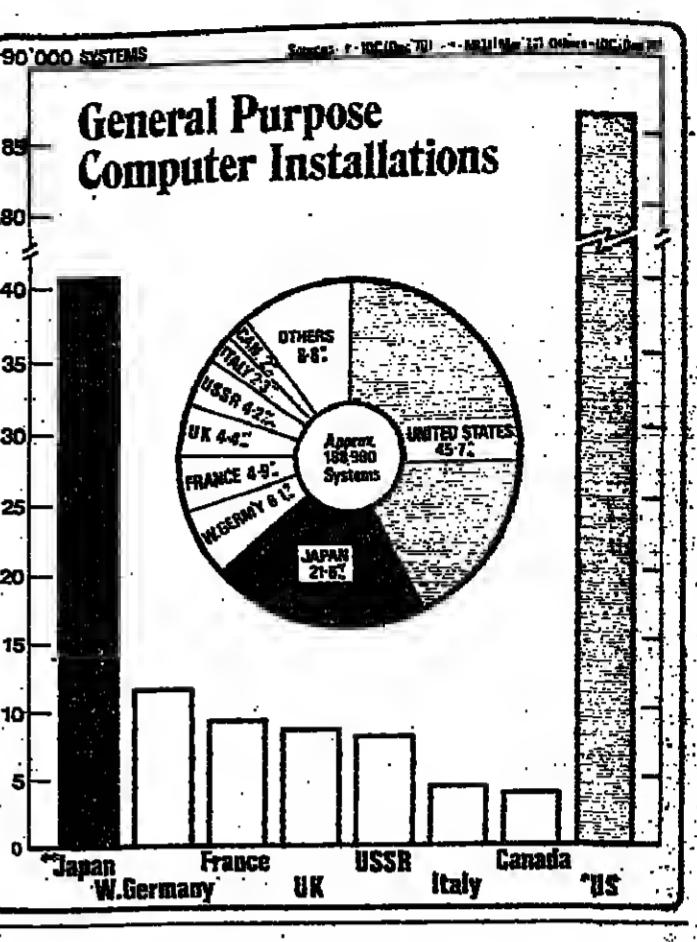
The December announcement added £40m for MAP, and quite rightly so, as well as freeing another £60m for education and training, unspecified. Hence Warren's £100m.

It is this type of nebulous approach to education and training that David Firnberg, head of the National Computing Centre, says is the worst aspect of the new Government strategy. Mr. Firnberg reminds the Government that the French have set aside a much larger sum than Britain for education in data processing, while Japan's information-oriented education programme, drafted in 1972 (1) provided for an expenditure of \$36bn in the period 1972-85. That is over £1bn a year on education alone.

Controversy On Immos, Mr. Firnberg says that part of the current controversy stems from the fact that NEB is using public funds to back the entrepreneurial enterprise of three individuals. And as a general, but cogent, observation is underlines the danger in a small market such as that of the UK in splitting up available resources between too many recipients, or promoting ventures in areas where there already is savage and lethal competition, such as in office electronics.

He warmly welcomes any boost to application of computer techniques. To look a little more closely at what may befall Immos and GEC-Fairchild, it is valid to point out that GEC has a history of abruptly terminating any manufacturing operation running at a loss. Sir Arnold broke with Mullard at a very early stage in the game when Associated Semiconductor Manufacturers was not yielding according to his taste. Later, when English Electric-Marconi was absorbed, Marconi's £15m showpiece plant near Chelmsford, making a series of standard integrated circuits, was closed down and all development concentrated in a small area at Wembley.

The reason for these moves,



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Retail trade systems

A REVOLUTION at the checkout is planned for the retail industry in the 1980s as more and more retailers - especially the big supermarket chains - invest substantially in new electronic sales systems.

The supermarket chains, including Tesco, Sainsbury, Fine Fare and International Stores, are leading the way in the introduction of computerised checkouts because of the substantial benefits that higher stock control and management information can bring in a high-volume business such as food retailing. But retailers from all other sectors of the industry are looking closely at the latest technology - and the manufacturers themselves are anxious to achieve as wide a market as possible.

In addition, the most sophisticated of the new systems now on offer give shoppers a fully-detailed till receipt, describing each item and the price paid. Items are either keyed into the machine or read by a high-speed optical scanner which decodes a special bar code printed on the product. Such detailed information provided when customers pay is claimed by the manufacturers to give shoppers greater confidence in the accuracy of the till, and it is argued that shoppers who are happy with a store's checkout arrangements are likely to shop there again.

The electronic systems are also aimed at speeding up shopping flows, avoiding long delays, and the claimed savings in management costs should also help keep prices in the shops stable.

However, it is the management aspect of the new computerised checkouts - rather than simply providing more information for shoppers - that is the real reason why the big British retailers are showing so

much interest in them. The new systems have the potential to completely change the face of retailing management, enabling stock control procedures to incorporate at least daily - if not more frequent - stock reports. Armed with such up-to-date information, the retail executive then is able to respond to sudden surges in demand for particular products, or identify areas where sales are weakest and not earning enough. In a fast-moving business such as food retailing where time literally does mean money and the volume of trade is large, the retailer who is able to make the fastest decisions usually comes out ahead of the game.

First there are electronic units that perform almost exactly the same work as the electro-mechanical units they are due to replace. The manufacturer has simply replaced the internal, electro-mechanical components with modern electronic ones. Prices, therefore, can vary enormously according to whether the unit is needed to serve only a few customers a day, or needs to stand up to the pounding received at a busy supermarket checkout.

At a more sophisticated level are the so-called "stand-alone data capture units". These perform all the normal functions of a cash register, but also record information about sales on an internal magnetic tape cassette which can be removed at the end of each day, or once a week, and taken away for computer processing.

At the top-end of the market are the fully computer-controlled systems which incorporate laser-scanning. These have electronic units at each checkout controlled by mini-computer in the shop or, in some cases, by a remote computer connected to the store via a telecommunications link. Such systems are much more flexible and have many more facilities than the stand-alone units.

IBM has emerged as one of the main suppliers of the new computerised checkouts for retailers. It has three main systems on offer: the 3850 retail system; the 3860 supermarket system; and its new 5280 retail system.

The 3850 consists of a point-of-sale terminal, merchandise ticker encoder, a visual display-based purchase order/receipt terminal and a powerful controller that links the shop's retail system with a main computer.

The 3860 aims to integrate

THE LOGICAL STEPS

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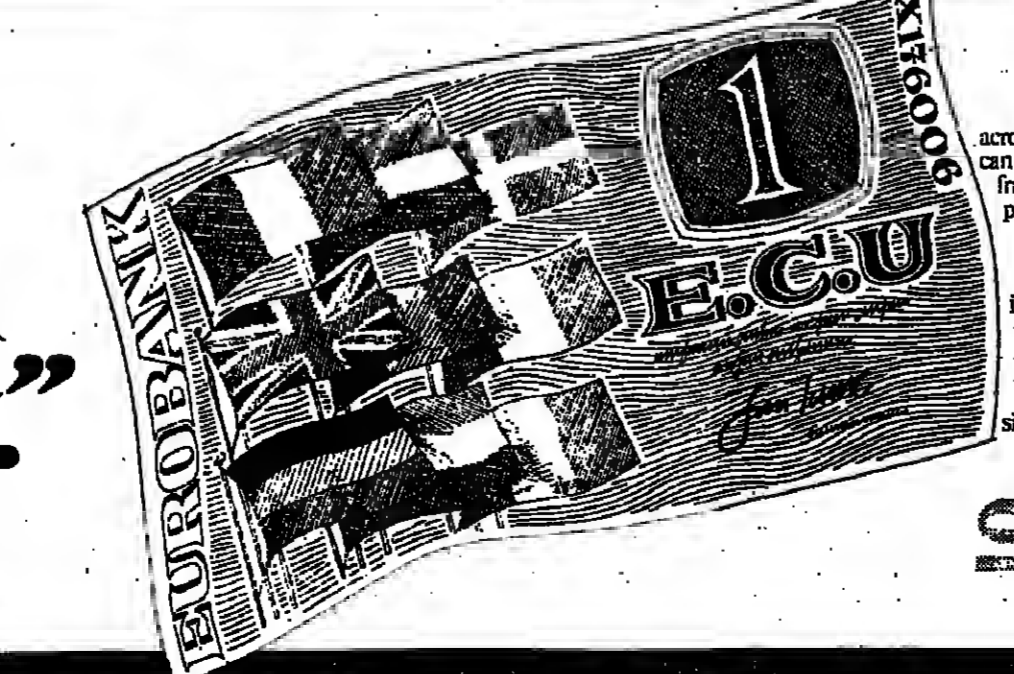
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THE COMPUTER INDUSTRY V

A revolution in the office

A REMARKABLY wide range of companies is now committed to the belief that the office equipment market for computer driven systems will show very rapid growth in the next decade.

The emphasis which International Business Machines is beginning to place on small communicating systems and on terminals is a major indication of this trend. The development of computer-like products by the copier giant, Xerox points the same way. In the U.S., a very large number of smaller companies are attacking the market while General Electric has come in with a new printer. In Europe two large multinationals, Philips and IIT, whose centre of gravity has hitherto been well away from the sector, are developing a wide range of products for the office.

More traditional office companies like Olivetti and Adler, which have been diversifying into the small computer market, are now developing products which will communicate with each other. Major computer companies like International Computers Limited (ICL) which have mainly been selling larger systems, are considering how to move down-market into smaller equipment. At the same time electrical companies with a broad base in heavy engineering, particularly Siemens in Germany and the General Electric Company (UK) are starting to move strongly into office equipment. Siemens for example has recently launched a word processor in the UK, and GEC has bought the U.S. office equipment company A. B. Dick as a starting point for its new strategy. Even the British Government has become involved with a £40m office equipment company called Nexos, set up as a subsidiary in the National Enterprise Board.

Several fundamental trends in society and in the evolution of electronics technology are causing this great focus of interest. First the continual automation of factories will displace more manual workers and add to the proportion of administrative, clerical and service work. Second, the scope for automation of factories will begin to be limited by political and trade union pressures as well as by the fact that automation will reach a natural technological imposed limit. Automation of factories, with the attendant capital costs will accelerate the dominance of large multinational companies, making large volumes for international markets. The television, automotive and calculator and watch industries are just three examples.

Complex

These large companies will inevitably require highly complex management structures with sophisticated communications and information networks to co-ordinate their production and marketing. Already most major companies use large computer installations to deal with accounting, stock control, inventories and many other aspects of the business. Often these functions are carried out in fairly big central computer installations. The next generation of computer equipment will be aimed at integrating these central functions with computer techniques used for routine tasks in the office itself.

It is frequently said that the new office systems will depend upon the exploitation of the microprocessor or microcomputer, which can already be bought in its naked form for tens of dollars and will become both cheaper and more powerful. Certainly a complete generation of small office

systems has grown up on the basis of cheap, compact micro-computers. Many of the more successful have been focused very sharply on a few particular needs of the small office, particularly accounting and payroll calculations. They have been sold, not fundamentally as computers, but as accounting machines with rather better features than the electro-mechanical equipment they replaced.

Capabilities

In one sense, however, the micro-computer is becoming the least important part of the office equipment systems which are being developed. It is now taken almost for granted as a basic component of almost all new machines, no matter what they do, so that micro-computers will become like electric motors, a vital driving force which is one of the least interesting aspects of a piece of equipment to the user.

Attention is shifting, and will continue to shift rapidly towards capabilities of so called peripheral equipment like printers, magnetic tape and disc storage units and television-like displays. At the same time customers will become more and more interested in how all these items of equipment can be connected into a communicating system.

Electronic typewriters, copying machines, accounting machines and magnetic filing systems are all capable of being wired together through a company's internal telephone system, or, with suitable conversion equipment through the public telephone network to remote sites. Use of ordinary telephone lines limits the network to relatively slow speeds for the transfer of information. Where the network has to carry a large amount of traffic, buildings can be wired up with high speed cable, carrying a constant stream of information from office to office.

Although the information will be carried in a stream of electronic pulses (the "bit stream") which is used and understood by computers, communication rather than computing is likely to be the essence of such networks. Bit stream can be used to encode the human voice, television pictures, facsimile images of documents or simple alphanumeric characters. A network once established can handle all these different types of traffic simultaneously, although the transmission of a facsimile document uses much more of the electronic pipeline's capacity ("bandwidth") than the transmission of text in a form similar to that of the Telex.

Economics

The economics of establishing an electronic communications network within an office will become more attractive as extra pieces of equipment are added. Only the very largest companies will want to install a complete system all at once, and even they will wish to add new items as they come on the market.

A great advantage will therefore be reaped by those companies which can offer a complete system of compatible equipment. Customers will want to be sure, not only that all the machines which they buy talk the same language, but that future models still on the drawing boards will be compatible with earlier generations of equipment.

These ideas probably seem futuristic to office managers who are still replacing mechanical typewriters with electric machines, and who tend to think of small office computers as performing a special function, like accounting, required only in a particular office. However, sceptics should pause to consider the way in which plain paper copiers developed in little more than a decade from being an expensive novelty to an almost universal item of equipment.

Acceptance of the new systems will greatly depend on the ability of manufacturers to reduce the cost of some of the most important items of peripheral equipment. This is particularly true of electronic typewriters or "word processors" and so-called "intelligent copiers."

The essence of a word processor is that a typewriter key-stroke operates an electronic switch instead of a mechanical linkage. The electronic code corresponding to each character is stored in a memory similar to a calculator memory, or recorded direct on to a magnetic tape or disc. The word processor includes a micro-computer which allows the text to be corrected or edited in its electronic form. The memory is then

played back to drive a printer, which produces the finished document. Clearly the electronic data can be sent to a printer in another room or another building to produce "instant memos" or the beginnings of electronic mail. The keyboard and the electronics of such a machine are becoming very cheap to manufacture and could before long compete even with a manual typewriter. Printers, on the other hand tend to be rather expensive to produce. However, some intensive development work is now being put into the production of new methods of printing.

As a result of this work a range of new printers is likely to come on the market in the early 1980s, including some which are very competitive with the ordinary typewriter.

One promising development from IBM and A. B. Dick is the ink jet printer. This is a device which can "paint" characters on a page by means of a jet of ink whose direction can be altered by applying electric charges to focussing plates nearby. SBS Publishing, the Californian analyst, say that print heads for such printers can be manufactured very cheaply at about \$20 and have a very long lifespan.

It is possible, therefore, that ink jet printers will replace ordinary printers in many applications. The special advantage, however, is that the ink jet can move in any pattern, and is not therefore constrained to reproduce particular type fonts. An ink-jet printer could therefore be used in an "intelligent" copier in conjunction with a scanner, which first converted the image of the page to be copied into electronic code. Such scanners are already used in facsimile transmitting machines.

Advantage

The great advantage of this type of copier over the conventional electrostatic plain paper copiers, is that the machine which scans the original document need not be in the same place as the machine which produces a duplicate. They could be connected by a cable or telephone wire and could be used for communication in just the same way as word processors.

More important, the electronic image of a page could be put through a computer processor before it is reproduced. It could therefore be changed in size, altered in content, simply filed or transmitted to another office before the copy is made.

It is obvious, therefore, that as machines for typing letters and copying documents begin to include a stage at which the information is put into electronic form, the advantages of communicating networks of similar machines will rapidly begin to be exploited.

The larger networks will be managed by computers, and they will also include numbers of small computers carrying out special tasks like file management and accounting. Executives will be able to use the networks for internal communication while using it at the same time to gain access to company information stored and processed in different departments.

Networks

In the longer term company systems will want to hook into the larger national and into international data-carrying networks which are now being developed. One of the earliest of the specialised data networks was Teletext in the U.S., which switches "packets" of data throughout the country. In Canada, the Datapac and Info-switch services were established in 1977. In Europe, most countries are now developing high speed data networks, which are expected to be in widespread operation by 1980.

In France the system called Transpac is now starting operation. In the UK a switched data network will be developed in the early part of the next decade, and in Germany, the Datex service combines Telex and data transmission. Initially, these public data networks will be used for inter-communication between large computers or for high definition facsimile machines in regular communication. However, before long they will undoubtedly be used for electronic mail between large centres, transmitted during the idle hours of darkness. Eventually, when all telephone conversations are encoded in computer language, the distinction between date and voice networks will no longer exist. However, because of the vast amount of capital sunk into existing telephone networks, this will be a slow evolutionary process.

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THE COMPUTER INDUSTRY VI

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No stopping the Japanese advance

THE STRENGTHENING of the dollar against the Japanese yen, the lowering of Japanese tariff barriers against foreign computers and the general discussions about the imbalance of Japanese trade have all helped to postpone the feelings of anxiety, which the country's computer industry is beginning to inspire among competitors.

Yet the Japanese computing industry remains a serious long-term threat to its American rivals; and consequently any other computing company in the world.

Although Japanese computer exports are still quite small, there is something slow, deliberate and inevitable about the Japanese advance which can chill the heart of any rival data processing executive, especially if he is accustomed to a time horizon which is not measured in decades.

The stated objective of the industry led by Fujitsu and Hitachi is to increase exports from the present 5 or 6 per cent of domestic production to about 30 per cent in a few years' time.

Over the years a series of re-alignments have taken place among these rivals which demonstrates the impressive power of Japanese industrial planning. Last year, indeed, the Government managed to encourage a further shifting of the balance towards its avowed aim of creating one strong group in the large machine business, backed up by strong competition in the market for smaller business and process control systems.

Eight years ago, Japan had six major companies in the computer industry, all competing to develop mainframe computers for the domestic and international markets. It was obvious that Japan, with a domestic market only half the size of that in the U.S. could not support six different technologies.

Domestic

By 1965, the Ministry of International Trade and Industry (MITI) expects that the total domestic installation of computers will have risen to 100,000 systems compared with the present total of a little under 50,000. By that date, annual domestic production is expected to have reached a value of \$8bn, which implies that a third will have to be exported. This target accords with that of Fujitsu, the largest company in the business, which is now making strenuous efforts to develop and expand its network overseas.

Since the annual growth of the Japanese domestic market for computer systems has been slowing down and is not expected to exceed 13 per cent a year in the immediate future, exports are an absolute necessity if the industry wishes to continue its previous rapid expansion.

It is true that the Japanese companies still have the possibility of increasing their share of their own domestic market from the present 55 per cent. However, the current exchange rate and the reduction of tariffs in April last year (from 13.5 per cent to 10.5 per cent for processors and 22.5 per cent to 17.5 per cent for peripherals) has greatly helped the Americans to maintain their position in Japan.

Furthermore, International Business Machines (IBM) has recently been making a strong counter-attack against its imitators in the U.S. and in Japan with an impressive round of price cutting.

IBM has been able to hang on to its 32 per cent share of the Japanese market for computers sold to major industrial companies. By comparison, Fujitsu has just under 20 per cent of the market and Hitachi 18 per cent.

Fujitsu and Hitachi are, however, co-operating closely in the development of a computer technology which is almost completely compatible with that of IBM. It is realistic, therefore, to lump their shares of the market together and compare IBM's 32 per cent with 38 per cent for the Japanese "plug compatible" rivals to IBM.

The other main manufacturers are: Oki Electric, Nippon Univac, Nippon Electric Company (NEC), National Cash Register (NCR) Japan, Toshiba, and Mitsubishi.

Over the years a series of re-alignments have taken place among these rivals which demonstrates the impressive power of Japanese industrial planning. Last year, indeed, the Government managed to encourage a further shifting of the balance towards its avowed aim of creating one strong group in the large machine business, backed up by strong competition in the market for smaller business and process control systems.

The Government therefore used its substantial leverage through development grants and other means to encourage the companies to form three groups. They were: Fujitsu with Hitachi, NEC with Toshiba and Mitsubishi with Oki.

Nippon Telegraph and Telephone (NTT) was also closely involved in the joint development of very large scale integrated circuits in which all the companies co-operated.

These groupings were later reduced effectively to two, when Oki peeled off to concentrate on peripherals and Mitsubishi joined the Fujitsu-Hitachi group. Then, last year, Toshiba effectively withdrew from the large system business when it transferred its marketing of large systems to a joint NEC-Toshiba Information System Company, which is controlled 60 per cent by NEC with a 40 per cent stake by Toshiba.

This effectively means that Japan has two groups in the large systems business, one which is making machines which can plug into an IBM installation (the "plug-compatible" FACOM-HITAC M-200 series made by Fujitsu and Hitachi) and NEC's ACOS-series systems which are not compatible with IBM.

The NEC-Toshiba group has about 15.5 per cent of the Japanese market, which is certainly viable, but perhaps not comfortable compared with the IBM or the Fujitsu-Hitachi shares.

Exports

The main advantage of both Fujitsu and Hitachi is that they are in a better position to build up exports than the group with computers made to an entirely Japanese-developed architecture which is not compatible with that of IBM. For the Japanese understood at an early stage that the export of computers would not be as easy as with consumer electronics, motor cars or even ships and steel.

The main reason is that computer systems must be intimately connected with the business methods and the operating philosophies of the companies they serve. A computer system is not analogous to a lump of hardware like a ship, a car or a television set, which can operate with perhaps minor modifications anywhere in the world. The computer system must be tailored very precisely to the needs of the customer, this requires, not merely an understanding of his business, but fluency in the language of the customer.

Furthermore, most computer users are tightly locked into the system which they already use, since a change is likely to mean expensive re-programming delay, and possible disruption of their business.

For these reasons Fujitsu and Hitachi decided to follow the lead of the IBM "plug compatible" manufacturers, which aim to sell machines in competition to IBM mainly to customers which already have an IBM installation.

Fujitsu, accordingly, forged a strong link with Amdahl, the pioneer of the U.S. plug compatible manufacturers, by providing finance at an early stage in exchange for 26 per cent of the equity. Amdahl is now the main exporting outlet for Fujitsu in the U.S.

Last year, in addition, Fujitsu concluded a potentially significant agreement with Siemens in West Germany. Under this agreement, Siemens will market Fujitsu's larger machines as a complement to its own range of IBM compatible machines.

Hitachi, meanwhile is selling its machines into America through Intel (not to be confused with Intel, the semi-conductor company). The larger Hitachi machines complement the smaller IBM compatible computers which Intel obtains from National Semiconductor.

In addition to pursuing the obvious markets in the West, the Japanese are now very active in exploring the very considerable potential for selling computers to China, Russia and the countries of the Far East.

Disadvantage

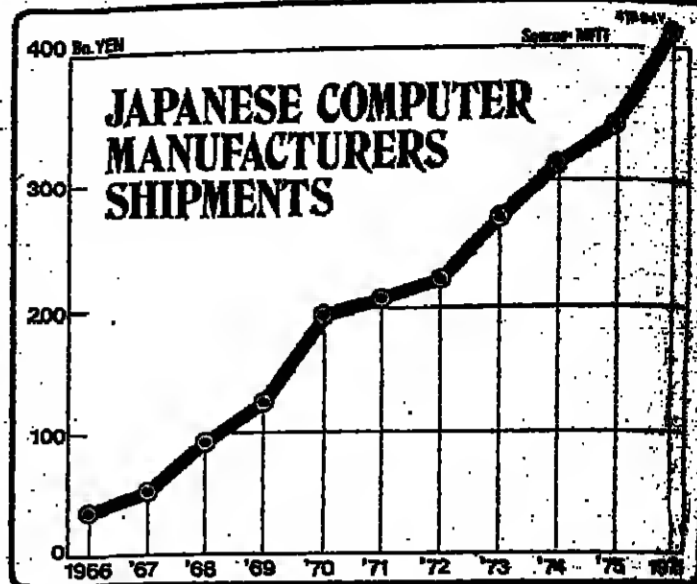
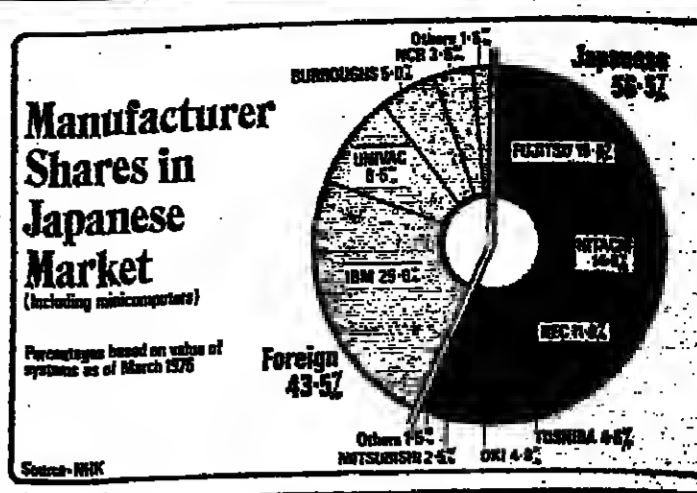
Exports to Communist countries, however, suffer the disadvantage that they are subject to the veto of COCOM, the international organisation which vets strategically sensitive exports to Communist countries. In the last year, the Americans under the leadership of President Carter, have shown themselves to be very suspicious about such exports.

Although the strategy of expanding exports through the plug-compatible route is the most sensible—and perhaps the only strategy for the Japanese at present—it suffers the disadvantage that it may, at any time, become vulnerable to pressure from IBM.

Some say that IBM is constrained by its own vast base of users who want to go on using the existing software. On this view, it would be difficult to change the design of IBM machines in such a way as to hurt the plug compatible manufacturers without at the same time raising an outcry from existing users.

On the other hand, there is the ever-present possibility that IBM, with its huge research effort, will find a way of making machines which cannot be imitated because they include vital parts of their internal programming or microscopic circuits (hardware).

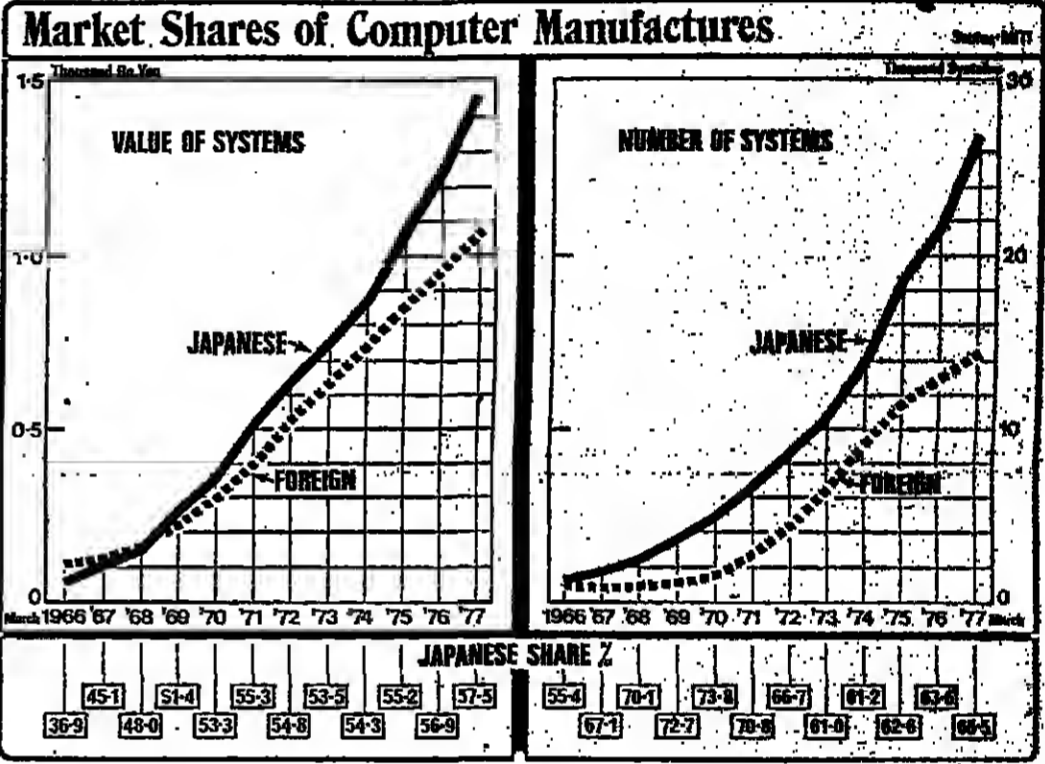
Because of this danger, the Japanese Government has been strongly encouraging the development of software both for operating systems and applications. The aim is clearly to make the Japanese industry self-sufficient, so that it could survive independently of anything IBM chose to do. One of the major projects includes the development of pattern recognition systems, which are being produced jointly by all the major companies with a \$200m grant over a seven year period.



JAPANESE COMPUTER BASED COMPANIES

Companies	Industrial electronics sales (% of total sales)	'78
Fujitsu	46	1,200
NEC	33	1,000
Toshiba	22	1,170
Hitachi	15	1,000
Mitsubishi	25	970
Oki Electric	70	440
Omrca Tateisi	95	440
NCR Japan	100	390
Nippon Univac	100	240
Matsushita Communication	55	240
Tokyo Electric	55	160
Kokusai	75	70

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THE COMPUTER INDUSTRY VII

Fast-growing 'desk-top market'

THE RISE in demand for personal computers has astonished even the more optimistic manufacturers, so that the small, desk-top computer is now beginning to emerge as a highly important part of the industry. By 1982, Dataquest, the U.S. company analysts, predicts that the total market for personal computers in the U.S. will have risen to \$2.4bn a year compared with estimated calculators shipments of \$500m in 1978.

Only a few years ago the idea of a home or office desk computer was a mere twinkle in the eyes of a band of dedicated hobbyists and perhaps a number of professional engineers, eager to exploit the possibilities of programmable calculators, micro-processors and small mini-computers. But recently identifiable mass markets have emerged for products which are cheap, compact, and often have an extremely impressive amount of computing power.

Since the potentials of use for very small computers are so varied, it is worth pausing to ask

exactly what a personal computer is. Dataquest defines it as a small desk-top computer intended to meet business, professional and home uses. Typically, personal computer products in the study range from \$15,000 down to a few hundred dollars. Applications range from business record-keeping and professional problem-solving to educational aids in schools and hobby home uses.

Personal computers developed with inevitable technological logic from the potentialities of the micro-processor and the rapid reduction of the price of memories and other components. As soon as the possibilities of making small cheap computers was grasped, a large number of companies in different fields started to think about the possible uses for them. As a result, the market now presents a confused spectacle with several different strands interwoven.

The main categories of use for small computers overlap. They are: for small businesses,

professional engineers and scientists and the general public. Two further categories have been identified which in the long term are expected to be less significant, although both are showing a healthy market at present. They are educational users and hobbyists.

Dataquest puts its estimate of the potential markets in the U.S. for each of these categories in the adjacent table. The figures suggest annual growth rates of about 50 per cent in the business, professional and education markets, and a huge 167 per cent a year growth for home computing.

In view of the complexity and size of the potential markets, it is not surprising that several very large companies with different backgrounds are now beginning to show an interest. Texas Instruments and International Telephone and Telegraph (ITT) are among the largest companies shaping up to compete in the home computer market, although Tandy, Commodore and Apple are the main

competitors in the field at present. At the same time Hewlett Packard has established a leadership in the supply of the more complex type of equipment for scientists and engineers, while International Business Machines (IBM) is reported to have exported 5,000 desk-top computers valued at \$95m last year.

Potential

Manufacturers are now converging on this fast-growing market from at least six different directions. First, there are the manufacturers of calculators, including Texas, Commodore and Olivetti, which are moving from the top range of programmable calculators, often including a printer, to make more versatile machines which are, in essence, computers. Then there are computer terminal manufacturers, which are reducing the size of their machines and adding to them intelligence and local memory. Eventually, some of these intelligent ter-

minals could become personal computers, especially for those who would like to link them to larger networks.

Third, consumer electronics companies are beginning to exploit the potential for adding a processor and memory ("intelligence") to the domestic television set to make it into a home computer. ITT in Europe, for example, is marketing the Apple computer as an adjunct to the television set.

Fourth, there are the hobbyist manufacturers which are moving into a television set. Apple and Tandy's Radio Shack have both moved into the market from this route. Then there are the instrument makers, notably Hewlett Packard, which are bringing out desk-top computers, particularly for scientific applications, involving monitoring and controlling a range of instruments and performing calculations with the results. Hewlett Packard is also a maker

of programmable calculators, so that it is converging on personal computers from two related directions.

Last, there are the manufacturers of larger business machines, led of course by IBM, which certainly can be expected to make desk-top computers for the business market as soon as demand appears favourable.

Without doubt it is the enormous long-term potential for expanding sales to home users that is attracting the main interests of companies such as Texas and ITT. However, home and business use of personal computers probably will overlap to a considerable extent. A small businessman or shopkeeper, for example, may buy exactly the same unit as is used elsewhere for playing computer games in the home, learning programming or other educational purposes.

For example, Commodore, which has sold 25,000 units of its Pet home computer, estimates that 80 per cent have been bought by small businesses and schools, and the other 20 per cent by private users. The Pet is sold in hi-fi shops, alongside video-recorders and cassette decks, as another consumer toy, yet one of its main markets has proved to be for processing accounts and for teaching people the elements of programming.

medical diagnosis, legal consultation and even "psycho-analysis" by home computer.

First, the educational uses can be divided between programmes intended to teach and develop computing skills themselves and programmed instruction in other subjects. Increasingly, people will want to learn programming, either as a pure recreation or for possible use in their working life. The home computer's capability for giving programmed instructions will also be used for many subjects quite unrelated to computing. Programmes for teaching mathematics, history and even languages will be developed, probably in conjunction with correspondence courses and institutions such as the Open University.

Second, the entertainment possibilities of home computers will be extended from television games to all sorts of information related to other pastimes, as, for example, data and analysis related to football or racing.

Language

Third, home computers will be used to help household accounting, preparation of income tax returns, calculation of mortgages and as a convenient store for names and addresses and other data. Those who enjoy gimmickry will doubtless use the machine for switching lights on and off and controlling central heating, but most people probably will stick to the cheaper specialist gadgets for this sort of function.

The technology for all these applications is now being developed in the different Viewdata systems of which the British Post Office's Prestel is the first and the most advanced. Viewdata systems depend on linking modified television sets (or home computers) to a central computer data bank by means of the ordinary telephone network.

How long will it be before home computing with all these uses becomes commonplace? The answer to that question depends on the speed and skill with which software is prepared and marketed, and also on the development of the communications networks for home computers which can be used at a reasonable price.

The market probably will build up from a core of self-employed people who have substantial needs for record-keeping and accounting in their homes, but before long it is likely that the flexibility and potential to use the machine for helping the education of children and adults will make home computers as common as hi-fi.

The importance of peripherals

THE COLLECTIVE noun "peripherals," which describes the equipment used in conjunction with a large computer, has become misleading in almost every sense.

First, the equipment—including magnetic disc or tape units for bulk memory—is no longer peripheral to the main operation of a computer system, but an integral part of it.

Second, the value of peripherals is now generally much greater than that of the central processing unit itself. And, third, many so-called peripherals are now being given computing abilities of their own so that they can operate either in a federal system with a large central processor, or in some cases as specialised computing machines.

In the U.S., the revenues from peripherals and terminals together account for nearly 60 per cent of all revenues from computer hardware (that is, excluding programming (software) and services). This picture is reflected in Europe.

Mackintosh Consultants estimate that in 1979 the total com-

puter hardware market in the four largest countries, France, Italy, the UK and West Germany, will be about \$5bn. Of this about 70 per cent or \$3.7bn is accounted for by peripherals. Mackintosh also shows the substantial imbalance of trade in computer peripherals in Europe, with estimated imports by the four major countries expected to total \$600m this year.

This clearly reflects the dominance of the U.S. over many parts of the peripherals market despite European efforts to redress the balance.

The importance of so-called peripherals is especially emphasised in the new mini-computer based systems which are beginning to find a wide business market, and even more in the micro-computer systems which are following them.

Mini computers were designed originally for industrial process control and the main reason for transplanting them to business systems was that they were much cheaper than the larger machines they replaced.

Now computer processors are being etched on to a single chip

of silicon only a few millimetres square. These chips can be assembled with other circuits on to a single circuit board to make a complete mini computer for only a few hundred dollars. A complete system, however, costs thousands of dollars, mainly because of the peripherals which are required to make it carry out a useful task.

These peripherals can be divided into two broad categories: magnetic memory units and printers. However, terminals, consisting of a keyboard and usually a television-like visual display unit (VDU) have to be considered in association because, in small systems at least, printers and even magnetic tape or disc units can be integrated into the terminal.

Magnetic discs are now developing in two directions. The smaller 5 1/4" floppy discs have become steadily cheaper and more reliable, so that they are now beginning to displace cassette tape units on all but the very smallest systems. The floppy disc works in a similar fashion to the larger units, with

a spinning magnetic disc and a tracking head which can "read" or "write" on to any part of the disc and can move automatically to the required track.

Disc units have to be made with extraordinary precision to ensure that the head locates the desired track on the spinning disc.

The capacity of the larger 8 in discs has been continually increased, a trend which will continue as single-sided discs are replaced by double-sided ones. Currently these disc drives can store up to 570 megabytes of computer information (570m characters). That is equivalent to about 100m English words or a library of a thousand novels.

These units can transfer information to the central computer at a rate of between 800,000 and 1.8m bytes a second. The higher speed is the equivalent of about three large novels every second.

For larger bulk storage, magnetic tape units and magnetic drums are still used, although many medium-sized installations have no need to go beyond discs. In the next five years, magnetic bubbles will start to

make important incursions into the mass memory market, particularly in systems which have to be portable or must be exceptionally reliable. However, the continued improvements to disc units mean that bubbles are trying to hit a "moving target" in terms of performance.

The main development of printers in the next decade is expected to be the replacement of impact technologies mainly by ink-jet and laser Xerography methods. Print speeds are likely to continue to increase beyond the 200 characters per second achieved by the best matrix character printers today. The worldwide market for impact character printers is currently around \$60m, according to SBS Publishing of California, and will reach \$627m by 1981.

However SBS expects that by 1985 only 30 per cent of high-speed printers will use mechanical technology. A description of one of the challengers, ink-jet printing, will be found in the article on office computers in this survey (page V)

M.W.

PERSONAL COMPUTER MARKET

	1978	1980	1982
Business	200	450	765
Professional	175	355	800
Home	35	300	675
Education	15	35	115
Hobby	75	85	75
TOTAL	500	1,225	2,430

Source: Dataquest.

M.W.

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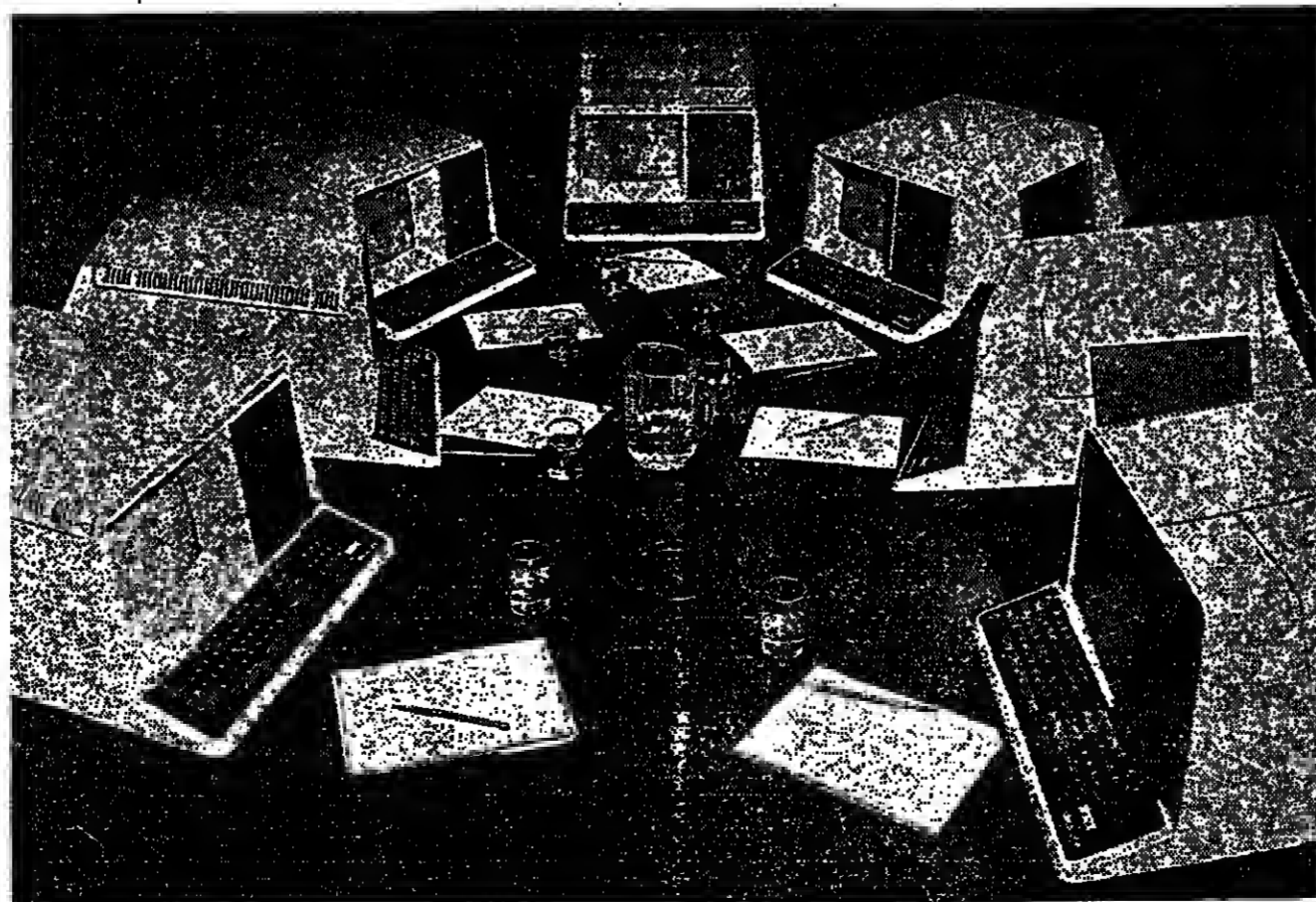
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a fully distributed network. TRAX comes system-programmed, so all you have to do is write the application program and let TRAX take care of the rest.

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THE COMPUTER INDUSTRY VIII

Smaller companies emerge

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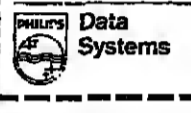
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Computers that talk your language

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PHILIPS

THE PATH along which the present day general purpose computer companies have evolved is littered with impressively large skeletons.

General Electric, the Radio Corporation of America (RCA), Xerox and Philips are among the strong companies which tried to enter what they believed would be a crucial market in the new technological age.

But despite their financial strengths all of them failed, often very expensively. The reasons for their failures were diverse, but all had a common thread: the difficulty of financing a very high level of research and development, and efficient support and service organisation and rentals from a market where the margins were determined ultimately by the over-powering presence of International Business Machines. The companies which have survived the shakeout all had to demonstrate some extra qualities of management technology or marketing strength.

However, since the fall of the Titans, a new generation of relatively smaller companies has started to emerge as challengers of the established forces in the computer market. Having learned the lessons of the last decade, they are avoiding the pitched battle with IBM and the other established companies which would result from trying to offer a completely new range of large computers as an alternative system.

Since all the major customers now have large data processing installations in operation, it is

obvious that no completely new challenger could hope to prise much business away from established suppliers if a change were to involve all the expense and inconvenience of re-programming and transfer to a new system.

The new entrants into the computing market have therefore had two possible routes open to them. The first, taken by companies like Amдах and National Semiconductor (in their different ways) has been to build machines which operate from an external point of view like IBM machines. It is possible for the smaller companies to ride on the crest of technological developments, of semiconductor components faster than IBM can. They have therefore been able to offer computers and add-on memories with substantially better performance and lower prices than IBM. By agility, they have kept ahead of the giant and obtained a most respectable slice of the market.

The other route for aspiring entrants to the computer markets was opened by the development of the micro-processor at the beginning of the decade. Simple micro-processors have been developed in the last two years into sophisticated micro-computers consisting of only a small number of components on one or two circuit boards. The semiconductor companies which were making the components, quickly realised that their customers which were putting boxes round the electronics and

marketing them as office systems, were adding a very large amount of value and profit.

At the same time as technological advance was increasing the complexity of components, the price was being driven inexorably downwards. The component suppliers foresaw therefore that they would be pushed further and further into a corner in which they would be supplying a shrinking proportion of the value of total systems.

Most of the major companies have therefore started to move into the computer market itself, starting with relatively modest micro-computers, mini-computers and office systems. In all cases, the logic of this move has forced the companies to place a greater and greater emphasis on developing total systems including software.

Among the latest contenders, National Semiconductor and Hewlett Packard are, perhaps the most interesting, although the impressive strength and determination shown by Texas Instruments must never be underestimated.

National Semiconductor is attacking the market with great vigour from two directions. In 1975, it bought a small company called Exyco, which had been started by a breakaway group of ex-IBM engineers to make IBM compatible mainframes. Only a year later, it had shipped the first system to Intel, the computer leasing company. Now National has shipped about 200 machines, employs 400 people on this side of the business and is planning to double the size of its plant this year. Even more significantly, it is working on the development of a machine which will emulate the largest IBM computers.

At the same time, the company has developed an office system called System 400, which is also IBM-compatible, but which is designed to sell on its own merits in the large and widening market for small systems. Although National is expecting to achieve sales of \$500m in the next year or so, it realises that it is engaged in a win or lose race to achieve "critical volume" before it is overwhelmed by its competitors. By the phrase "critical volume" it means sales of \$400m to \$500m the minimum needed to sustain the research and support network required for a viable computer operation.

Another example of a semiconductor company which is moving into computing is Texas Instruments, which is developing its own family of mini-computers and micro-computers. Fairchild is aiming to win a stake in the IBM-compatible market through its 30 per cent stake in Magnuson. Meanwhile, Hewlett Packard is moving into the computer market from the different direction of scientific instruments and calculators. It has designed a complete office system which is certain to be a strong challenger at the lower end of the market.

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Unemployment debate lacks information

THE DEBATE about the employment consequences of the so-called micro-electronics revolution has not yet reached anything like a serious level.

So far, there is very little to go on: Government reports and Ministerial speeches by and large content themselves with the view that those who predict terrible consequences are "exaggerating." Trade unions or academics, suspicious of the technology, tend to magnify the suddenness—if not the size—of the impact.

It may be that even after the next four or five years, when the technology has had time to impinge itself upon working life and labour demand, no one will be any the wiser about its total effect, or any more able to make predictions.

What is much more likely is that a number of case histories will have been built up; and it will be more possible to say, for example, whether the automation of clerical office work normally means a net job loss or not.

Ignorance of the outcome does not entitle the official training agencies, employers or trade unions to stand by helplessly while the changes occur. It is to the Government's credit that it has done so much to encourage debate about micro-electronics and started to spend money on special training programmes to find the personnel to manage the technology.

Part of the £100m that the Government has set aside for the industry over the next three years is to go on training another 3,000 computer software experts by the autumn of this year.

Some of the trade unions, too, have begun to teach themselves about micro-electronics and to devise policies for coping with it that process is certain to intensify. For the moment the lack of real information has led them with little choice but to prepare for the worst, despite official declarations that there is no sign of an employment holocaust.

Attitude

The official attitude is summarised by the Central Policy Review Staff. In this extract from its report on the social and employment consequences in November last year: "We have yet to be convinced that micro-electronics will be a major factor for the worse, unless the general prospects for employment make for increased unwillingness to accept technological change."

The report said those who had predicted substantial job displacement—figures of 3m to 5m have been quoted—did not back their forecasts with convincing analyses. They also tended to overestimate the speed at which traditional jobs would be displaced by the new products. Furthermore, said the CPRS, the last "computer scare" proved a false alarm: there were in many places (such as the civil service itself)

net job gains after computerisation, although the rate of increase in employment was probably lower than it would otherwise have been.

The CPRS also takes the somewhat optimistic view that technological change has always been associated with higher economic growth and rising real incomes. "This could be equally true of micro-electronics," it says.

Although microchips would mean higher productivity—less workers to produce the same output—there would be a new range of cheap, mass-produced goods and new services that would stimulate employment generally.

But the CPRS report qualifies its cautious optimism in one or two passages in such a way as to sound a serious warning.

First, it points out that there will be, whatever happens, a serious employment gap in the 1980s, for demographic reasons. Britain is trying to find jobs for large numbers of new entrants to the labour force already, quite apart from trying to prevent the loss of its industrial base.

Secondly, it notes that Britain has been relatively weak in the past in exploiting new, cheap, mass-market products: and it is from exploiting these markets that much of the employment growth would have to come.

Thirdly, it warns—as do all the reports that have come from Whitehall in recent months—that the consequences of not adopting the new technology rapidly will be far worse for employment than any of the consequences of adopting it.

These two latter points explain the considerable scepticism with which the CPRS report has been received by trade unions. Unions such as the Association of Scientific, Technical and Managerial Staffs and the white-collar section of the Engineering Union, TASS, have seen enough evidence of decline in traditional UK manufacturing industries in recent years to be less than sanguine about the extent to which new technology will halt that decline.

Broadly speaking, they find the CPRS view a complacent one. They doubt that the analogy with the computer revolution is a fair one: computers were, and are, expensive pieces of capital equipment. Employers have taken their time in introducing it. But microprocessors are cheap and allegedly all-pervasive.

Unions argue that companies will quickly be able to calculate their savings in labour costs when the microelectronic equipment is brought round by the salesman.

U.S. experience of the automation of offices seems to suggest so far that employers are attracted more than by the sheer productivity gain than by any saving in staff: but the theory is little tested—there—and in Britain scarcely at all.

More obviously, there is the

Designs

Similarly, Dutch Philips TTT, the General Electric Company (UK), Siemens of Germany, and Olivetti of Italy, and several other large companies have designs on the office market. Although the computers which they will be selling are small by present-day standards, it must be remembered that they are the size and power of large mainframe computers of only a decade or so ago. The office sector of the market has some special characteristics which are dealt with elsewhere in this Survey.

In addition to the semiconductor companies which are moving into computing, the larger corporations converging on the office market, and the IBM plug compatible manufacturers in the large mainframe market, there are the software companies, some of which are now beginning to emerge as significant independent forces in the market.

This is a result of the continuing trend for hardware (machines) to become ever cheaper, while the cost of programming (software) continues to rise. Software now represents well over half the cost of many complete systems, and in a few years' time it may be three-quarters or more, according to some estimates. Consequently, software houses which have designed a system for a particular application, particularly a complex system, using standard mini-computers, may buy in hardware for resale in a complete systems package. From this point, it is a comparatively small step to start manufacturing some of the hardware to adapt the system for special purposes.

Logica and Systems are two British examples of software companies which have followed this route.

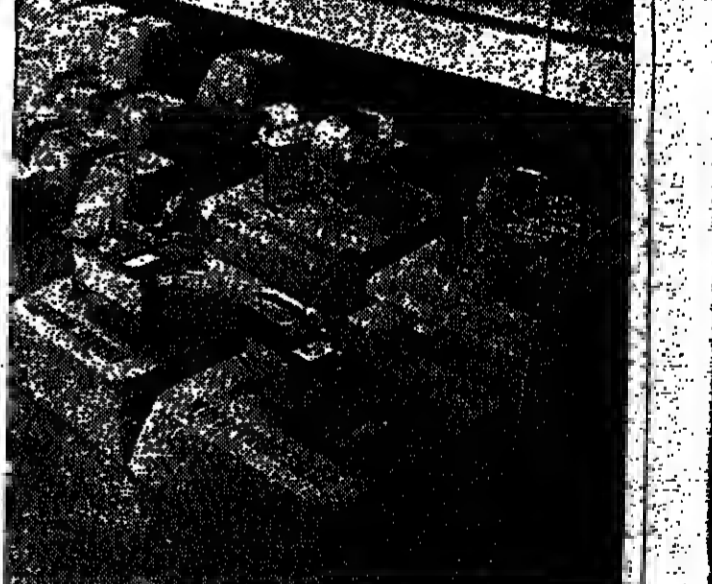
Thus, new companies have entered the computing market from several different directions. Taken together, they make the choice very much wider for a prospective purchaser than it was a few years ago. The Diebold Research Programme, for example, estimates in its Research Report E167 (Diebold, 5/8, Argyll Street, London W1) that a typical larger company is now dealing with about twice as many computer vendors as it was 10 years ago.

The cost and complexity of developing then operating systems for large mainframe computers is likely to prohibit even the largest companies outside the computing industry from trying to force their way back into the market. Indeed, the forces which caused the demise of RCA's General Electric's and Xerox's computing operations are as potent as ever. On the other hand, the rapid developments of technology, allowing enterprising companies to find many profitable sectors of the industry without confronting the largest companies head-on (even the plug-compatible manufacturers are only competing with IBM hardware in selected parts of its range).

On the other hand, it is very likely that industry will see the entry of some very big companies indeed over the next few years. The giant AT and T could, for example, become an important rival to IBM if it were to obtain a change in the regulations which prevent it from competing in the computer market—and it is still a large "it"; well, anything could happen.

N.W.

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THE COMPUTER INDUSTRY IX

Cost is makers' dilemma

COMPUTERS HAVE progressed marvellously in recent years, computing has advanced hardly at all. Today's machines are smaller, cheaper, more powerful and more reliable than their predecessors, often by orders of magnitude, yet these benefits derive from increasingly sophisticated micro-electronic circuit fabrication techniques and economies of scale in manufacturing rather than any fundamental changes in the way computers compute.

In fact, according to Glenford Myers of the IBM Systems Research Institute, New York: "Except for a few machines, for example some of those made by Burroughs Corporation, there have been no advances in the computer architectures of current systems since the 1950s."

What is more, there is little demand among computer users for such advances. Such is the size of the investment users have made in existing conventional hardware and software that there is no real prospect of radical change in the foreseeable future.

Nobody is anxious to repeat the experience of 1964 when IBM launched the System 360 series. Although a remarkable technical advance, it involved users in time and expense because programmes had to be rewritten to run on the new machines.

So computers will continue to get smaller and cheaper but if there are remarkable technical advances they will be well hidden from the user. Therefore, the question of future trends in computer technology can be seen as: what are the realistic limits of miniaturisation, and how will computer manufacturers respond to the problem of selling equipment which is becoming worth less and less very rapidly?

We are very far from the limit in micro-electronics. The silicon chips which lie at the heart of computer memories and processors are fabricated at present using optical methods and visible light to print patterns on the surface of the silicon. The practical limits using such techniques are close to being reached, although with further refinement it should be possible to use visible light to create a chip with the complexity of the 64K RAM—64,000 individual units of memory on a single chip.

Proven

X-rays or electron beams can be used to create even smaller elements. IBM scientists have already created a wire with proven electrical integrity with a diameter of only 150 Angstroms (half of one millionth of an inch). However, there are those who believe that for all practical purposes, the limits set by visible light are adequate.

For example, Iann Barron, director of strategy for Immos, the NEB-backed micro-electronics venture, believes that the 64K RAM level of complexity is adequate to build a complete "computer-on-a-chip" — processor, memory and connections to the outside world — and it is this that he sees as the key technological development. He thinks it is so important that to describe it he has coined a special name, "transputer," derived from transistor and computer.

But whether semi-conductor companies stick at the level of the 64K RAM or invest time and the considerable resources necessary to achieve greater complexity on the chip, there is no doubt that the power of computer systems will continue to go up, while the cost will continue to come down. It is generally reckoned that the improvement in cost performance is doubling in less than five years.

Or to put it more graphically, George Champlaine of Sperry Univac calculates that in 1960, the cost of one man-hour of labour would buy the execution of 1.5m instructions or the storage of one megabyte (8,000 individual items) of data on direct access storage for two days. In 1977, Champlaine says, the cost of one man-hour of labour would buy the execution of 23m instructions or store one megabyte of data for 15 weeks.

Another equally graphic illustration is the 4300 series which IBM released only three weeks ago. Data processing specialists are still arguing over whether these machines represent simply a stop-gap or a whole new series. What is certainly true is that they are stunningly cheap and cost effective compared with existing products. For example, the top-end 4341 processor runs at about 1.7 times the speed of the existing 370/148 but the complete system costs only about as much as a 370/138.

The dilemma for IBM—which supplies about 70 per cent by value of all the computing machinery in the world—is how to make money out of it which regularly doubles in performance while halving in price. All other manufacturers, if they are to stay in the game, are in the same boat.

There is a view that IBM and other manufacturers are waiting

Rank	Company	DP revenues \$m	Estimates for 1977		Reported data		Number of employees
			DP revenues (% of total revenues)	U.S. DP revenues (% of total DP revenues)	1977 total revenues \$m	1977 net income \$m	
1	International Business Machines	14,785	81	50	18,133	2,719	310,155
2	Burroughs	1,844	87	59	2,127	215	51,295
3	NCR	1,574	62	51	2,522	144	64,000
4	Control Data	1,513	66	65	2,301	63	46,000
5	Sperry Rand	1,473	45	59	3,270	157	85,684
6	Digital Equipment	1,059	100	64	1,059	109	36,000
7	Honeywell	1,037	36	63	2,911	145	75,840
8	Memorex	405	90	60	450	56	8,823
9	Hewlett-Packard	402	30	54	1,360	122	35,100
10	TRW	350	11	77	3,294	154	87,152
11	Kelco	285	71	50	402	32	3,900
12	Data General	255	100	65	255	29	8,590
13	3M	240	6	80	3,980	413	80,000
14	Automatic Data Processing	238	97	92	245	23	8,000
15	Xerox	209	4	100	5,077	407	103,977
16	General Electric	200	1	80	17,519	1,088	384,000
17	Amdahl	189	100	81	189	37	1,700
18	Computer Sciences	176	75	80	235	12	7,300
19	Storage Technology	162	100	92	162	11	3,985
20	Texas Instruments	160	8	90	2,045	117	68,521

for people who spend £5,000 today on equipment that would have cost £50,000 five years ago to discover that they cannot make it work—and then make their money through selling the necessary software.

Software—the programs which run the computer and run the applications loaded on to the computer—is the single element of computing systems which is not declining in price, but in fact, relative to the price of hardware, becoming more expensive. With unbundling, the separate pricing of hardware and software, it is expected that manufacturers will make their money out of providing the software to run their hardware that will cost

relatively little. Murray Laver, former board member for technology for the Post Office, describes this as "zero cost data processing." He also describes software as "pure crystallised labour."

Cumbersome

There are suggestions that with its 4300 series, IBM will move towards the total unbundling even of operating software—the software that runs the computer system. But above all, 4300 series points to the computer room of the future. In the past, computer rooms were vast, custom-built

affairs with false floors to hide away the bundles of cables which shackled the machines one to another and water-cooling equipment to remove the heat built up during processing.

Engene Amdahl, formerly IBM's chief computer designer, showed the way round these problems with machines compatible in terms of software with IBM but using advanced technology. He was able to air cool his large processors rather than use cumbersome water coolers.

The 4300 series points the

way to medium-sized machines which fit unobtrusively into the ordinary office and which require no special fittings. It means, for example, fixed disc mass-storage devices which are relatively tolerant of poor operating environments and an end to tape storage (which is not), though there are those who wonder how a security back-up can be provided without a tape fall-back.

Considerably research is already being carried out in reliability of computer systems and it is perhaps no coincidence that in the past two years the

British Computer Society's Awards for technological advance have been won by projects in this area. In 1977, there was Prof. Brian Randall's work at Newcastle on systems which recover from failure and in 1978 Dr. Roger Needhams' work at Cambridge on the CAP projects, a machine and an operating system proof against accidental or malicious damage.

Computer systems of today work in a linear fashion, that is they process instructions one after another in the manner of a model first set by John von Neumann, one of the fathers of modern computing. There are a number of research efforts in progress to improve on this scheme of things. At a number of British universities, researchers are attempting to implement "dataflow architecture" where there is a network of machines through which data flows. Processing occurs when data arrives at the strategic points.

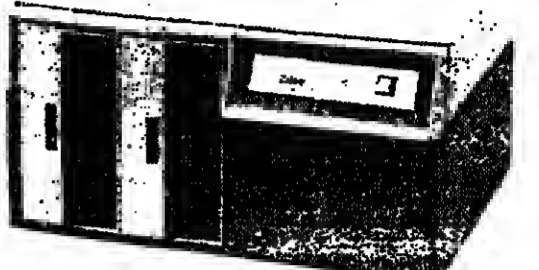
Then there is the brilliant ICL-distributed array processor in which processing elements are intimately associated with memory, making possible parallel processing.

It is intended for very large processing problems—meteorology and the like—and is used with ICL's biggest computer, the 2980. But returning to the original point of users' dislike of change, there is no doubt it could be used for simpler things, and Ed Mack, ICL's director of product strategy, would love to see it used to run a payroll.

Alan Cane
Editor, Computing

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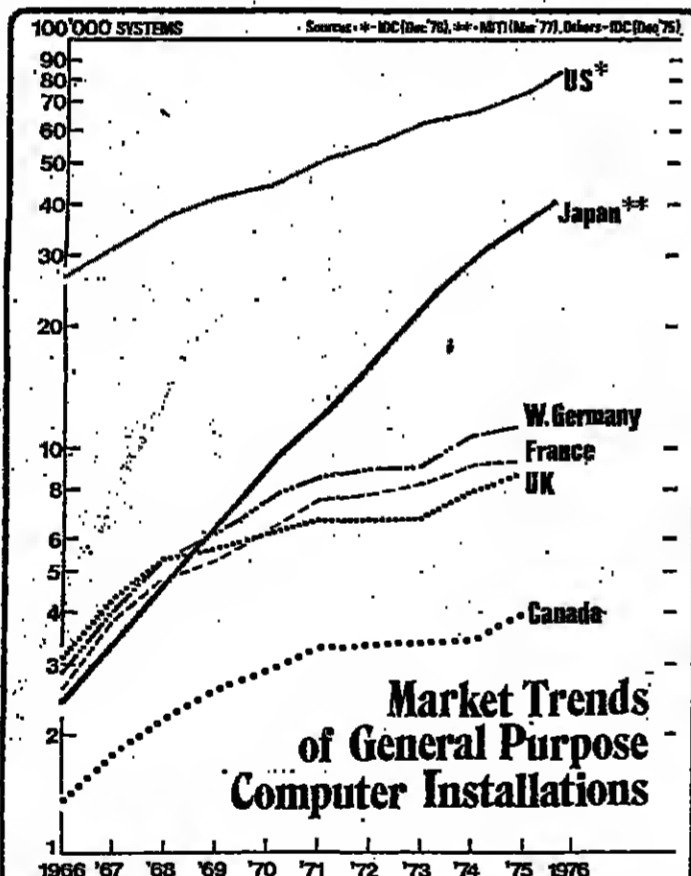
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Employment

CONTINUED FROM PREVIOUS PAGE

possibility that many of the jobs created by micro-technology will not be in the older industrialised nations, such as Britain, that are looking for industrial regeneration. In other words, much of the displacement of labour could be in the form of job exports—traditional manufacturers failing in the West and the new manufacturers springing up in the Third World.

Thus, the net job effect may be a positive one, but will it revive struggling industrialised nations such as Britain? Any worker displaced by cheap imports of textiles, motorcycles, television sets in recent years will take a pessimistic view of Britain's ability to seize and hold new markets. Incidentally, the suggestion that the cold shower of competition will invigorate British industry is no longer fashionable—perhaps because the cold shower signally failed to have the right effect when Britain joined the European Community.

Rapid

Today's prognostications are less joyfully worded; a very large conditional "if" is attached to every forecast. For example, the latest Treasury bulletin on the economy, devoting its main article to micro-electronics, has this to say: "In both manufacturing industry and services there will be job losses due to higher productivity or the outdating of existing products; and in some cases these effects will be substantial and rapid."

But against this, jobs will be created in the production of silicon chips and in software systems and applications. Early replacement of plant and machinery with new equipment

Five or six questions to ask your data processing manager about Prime computers



What's so special about this new range of Prime systems?

The Prime 450, 550, 650 and 750 systems give you more big system capabilities for less money than ever before. In other words: mainframe power at minicomputer price.

Is Prime compatible with our existing system?

The software is developed to internationally recognised standards and is therefore fully compatible with our existing systems.

Will Prime equipment give us enough power in the future?

Yes, we can easily add more disc storage and memory when we need it and we can increase the system power without rewriting the programs—so our large investment in software will be protected as our needs grow.

How will Prime support us?

Prime provide total system support with systems analysts, training for our staff, as well as Prime's own engineering customer service—from their branches in the City, West London, Maidenhead, Birmingham, Bedford, Manchester, Glasgow.

What about Prime as a company?

Prime are probably the fastest growing computer company. Prime achieved over 100% growth rate in each of the first five years and they are quoted on the New York Stock Exchange. In the UK they are already being used in banking, accounting, insurance, manufacturing, government, local authorities and education.

Fine—shall we buy or lease from Prime?

We can do either.

PRIME

Mainframe power at minicomputer price


For more information contact Michael Grant, Prime Computer (UK) Ltd., The Hounslow Centre, Lampton Road, Hounslow, Middlesex. Telephone 01-572 6241.

Christian Tyler

THE COMPUTER INDUSTRY X

Towards thinking machines

"Banks today are planning for the eighties and beyond. Philips are in a position to share our view-point."



Banks have always been closely involved with new developments in computing. Many major advances in data processing are the result of co-operative relationships between the banking community and its computer suppliers.

The Philips PTS 6000 Financial Terminal System is a good example. Originally developed by Philips in co-operation with a leading European bank, the PTS 6000 system has now become the world's leading range of financial terminal equipment, with 25,000 cashier positions in banks, building societies and local authorities.

Special versions of the PTS 6000 are currently under development in conjunction with banks in Britain and overseas, designed for the needs of cashiers in the next decade - and the next.

If you want to make the most of today's computers, talk to Philips first. You'll find we talk your language.

Computers that talk your language

To: Robert McCoo, Philips Data Systems, Elekro House, Brompton Road, Colchester, Essex CO1 5SE. Tel: 0206 915. Please send full details on the PTS 6000.

Name: _____
 Position: _____
 Company: _____
 Address: _____

PHILIPS
 Data Systems

AT STANFORD University in the sunny valley between the Pacific and San Francisco bays, some 200 postgraduate students are working on the problems of how to make computers artificially intelligent.

Work on the project is now so far advanced that many hard-headed companies are beginning to take more than a passing interest. Indeed they are so interested that they are offering large salaries to the best students to tempt them into corporate research laboratories.

In several other university centres and in the research departments of large corporations like International Business Machines, a ferment of activity has been generated by the possibilities of using "artificial intelligence" in the commercial world.

This may seem strange, even implausible, to those who have a nodding acquaintance with the series of failures encountered by researchers into artificial intelligence during the last few decades. Even some of the apparent successes, have seemed to demonstrate the inherent limitations of computer programming as a simulation of the methods of the human brain.

One colourful example was the programme called ELIZA, developed by Professor Joseph Weizenbaum at the Massachusetts Institute of Technology, to simulate psycho-analytic sessions. The computer was so good at "psycho-analysing" its "patients" that Weizenbaum discovered that many people regarded it as almost human, and even requested private interviews with it to give confidential information and receive support. The computer program, of course, showed endless patience in asking questions, and was cleverly designed to remember some of the patient's answers and bring them up later in the conversation.

When the program became generally known in 1968, Professor Weizenbaum found to his horror that many competent medical authorities were recommending that ELIZA, or computer programs like it, should be widely adopted in hospitals and clinics as an aid to the treatment of patients. However, the creator of this Frankenstein therapist knew that his program was in a very fundamental sense a fraud. The ELIZA program did not even have an "understanding" of natural language, let alone of the intricate human problems which it was supposed to be asking questions about.

As Weizenbaum explains in his book "Computer Power and Human Reason" (Freeman and Co., Reading) the program depended upon a series of clever "tricks" which enabled certain words or phrases to trigger off a seemingly intelligent response from the computer. Weizenbaum

had in fact chosen the psycho-analytical model for his program because it provided a context in which words are used rather vaguely and in which the computer could always issue a vague prompt like: "Give me an example," or "Tell me about your father," when stumped for an answer.

For this reason, the ELIZA program could not be translated outside psychoanalysis without producing ludicrous results. Similar objections applied to many other and more sophisticated attempts to simulate certain aspects of human behaviour. A programme called PARRY, for example, was developed by K. M. Colby which gives a very passable imitation of a paranoid patient under interview. However, one of the reasons for the success of this programme is that whenever the questioning becomes so keen that the computer gets out of its depth, it can simply revert to one of the ideas fixes of the assumed paranoid personality.

PARRY, like ELIZA, demonstrated, in some respects, the limits of possible understanding by computers. They showed that computers can manipulate language plausibly in certain limited contexts, but they cannot "talk" sensibly unless they have a thorough grasp of the subject matter under discussion. For that reason, much of the linguistic analysis which has

been undertaken by artificial intelligence workers, although interesting in itself, is considered by many researchers to be leading up a blind alley.

This point was emphasised by a spectacular programme written by Terry Winograd and described in his book "Understanding Natural Language" (New York, 1972). The programme called SHRDLU enabled the computer to direct an artificial hand by means of a television camera eye to change the positions of a number of boxes and pyramids on a table. Moreover the programme was able to respond to commands in natural language, like "Move the red pyramid onto the larger red box." It could deduce the sequence of manipulations that were necessary, including the moving of other objects in the space. It could describe what it had done, explain why and give a complete account of the configuration of all the objects within its field of view.

Even more interestingly, the computer could learn new concepts within its limited world. For example it could learn that a pyramid placed on a box represented a "steepie" it could learn the syntax of ownership: "This steepie is mine. That one is yours." Furthermore the computer was able to make quite complicated inferences. On the command "Put it down," for example, SHRDLU was able to deduce from the previous context which object the word "it" referred to.

Programmes similar to SHRDLU have been developed for industrial use, but usually their purpose is mechanical manipulation or assembly rather than intelligent thinking. From the point of view of artificial intelligence research, the SHRDLU experiment showed that a computer could indeed behave as intelligently as a human being in an extremely limited conceptual framework. When SHRDLU is transported out of its tiny world of coloured blocks and pyramids, however, the programme is completely unable to cope.

The conclusion which was reached by Winograd and by other workers is that development of computer intelligence should start less from an effort to reproduce generalised intelligent abilities, but from a very clear definition of a relatively limited task within a certain field of knowledge.

From this perception has developed a range of so called "expert programmes" whose aim is to simulate the analysis and advice which would be given by a human consultant when faced with a specific problem. One fruitful area is medical diagnosis where expert programmes are already proving to have good performance when the results of their diagnoses are measured against the opinions of live consultants.

One of the most fruitful of the modern approaches is through what is termed "rule based programming." This means that the computer programme is built round a set of rules, which the computer calls into play rather in the manner of a bureaucrat in a civil service department. The application of one rule will trigger the use of another rule, which will in turn bring other rules into the program. The computer will work methodically through the structure set out by the programmer, but because of the rapidity of its operation, the route it will take could not easily be predicted by a human in advance.

Once an expert programme has been set up, it can be applied with some modifications to different fields of knowledge. It builds up its detailed armoury of facts and methodology by first interviewing a real live expert.

In the case of geological testing for oil, for example, the computer will ask the live expert about all the physical and chemical tests which should be made, the order in which they should be made and the further tests needed, depending on the results obtained. Then finally it will ask how to assemble the results to predict the likelihood of finding oil and its whereabouts.

When the computer expert program has obtained and codified all the information which it needs from the human expert, it is ready to give consultations. An oil company prospecting for oil would, for example, be taken through a routine of question and answer by the computer on the tests which had been made, and would then make a prediction about the likelihood of striking oil.

Although the computer program can never display genius or intuition, it does have the

Possibilities

advantage over a human expert that it is tirelessly methodical and never forgets even the slightest scrap of evidence which it has been told. In very specific applications, therefore, the computer program may be as reliable as a human and usually much cheaper. Similar programs are being developed for military applications where they may be able to give extremely rapid up-to-the-minute assessments of the resources of arms and men available to a commander in a particular theatre of war, and even to make an assessment of the tactical situation which faces him.

One of the main tasks at present is to devise systems which will allow non-computer experts to ask the system unexpected questions, which would normally be handled by an intelligent aide. For example, a general may wish to ask "what if reinforcements are delayed two hours?" The computer must reply with the consequences for supplies of ammunition, food, communications, and probably much more besides. The general may not be satisfied, however, if he may want to ask: "How did you reach that conclusion?" An intelligent aide could answer that question whereas many computer programmes could not. However, the application of rule based programming allows the computer to tell the general which rules were applied in reaching the conclusion. From this he can estimate the assumptions, and perhaps test them by asking further questions.

From this an "intelligent" conversation can be built up, and although the computer would never show the dash and inspiration of say, Napoleon, it might have given him some useful cautions on the logistics of marching to Moscow.

Such systems are now beginning to emerge into commercial significance, largely because of the continual fall in the costs of computer processing power and memory. Applications in law, accountancy, medicine and indeed in most professional fields are opening up.

These systems are a long way away from the general purpose, humanoid robots of science fiction. But some of the systems look sufficiently life-like to give serious pause for thought.

M.W.

Europe lacks a united front

CAUGHT BETWEEN the need to be gentle with powerful implanted offshoots of multinationals and the ever-present threat from Japan, Europe's officialdom, and senior civil servants in the various member countries in constant contact with Brussels, have yet to present anything like a united front in the computing industry.

True, great advances have been made so far as the service bureau and software industries are concerned. But these are manufacture-independent and brain-intensive to a high degree,

and there is the rub. As soon as a hardware producer, especially in these lean times, can claim to show that government or supra-national authority actions are threatening him, or even bampering him, then he will win a bearing and will be able to bring powerful lobbying action to bear.

Last year's report and plan for action in advanced components prepared by Mackintosh Consultants primarily for the German Government, but consulted by all European authorities, has had little or no effect towards producing a Common Market approach to the data processing problem, despite the crucial importance of advanced components for the development of processors and their memories, as well as the discs, printers and tape decks which serve them.

As in the early days of computers, the approach remains narrowly nationalistic and no one in Government appears to be prodding "national" companies to seek European bed-fellows—the trend has been, and still is, to conclude some form of alliance with an American partner despite the difficulties and dangers of operating in that market.

This is not to underestimate the difficulties of planning and executing a European-wide approach to an important problem—indeed the experience of the Comecon countries with the much-delayed Klad series of computers made in several of the Eastern bloc nations, but coordinated from the USSR, shows how difficult a multi-country approach can be, despite the tighter planning/control possible throughout Comecon.

Failure

It would be wrong to blame the Eurocrats and dishonest to attribute the failure of European ventures entirely to Gallic pride. Both major parties in Britain must take some responsibility for the failure of at least two European-oriented proposals.

ICL was on the point of acquiring or merging with Machines Bull with a dowry, or purchase price, of about £90m just before the advent of the last Heath Government. But as IRC (Industrial Reconstruction Corporation) was anathema to the Conservatives since it was a Tony Benn brainchild and as IRC was the marriage broker, the project failed.

And who, under the Wilson Government, prevented the close association between ICL and Unidata (Philips-Siemens-CII) that would have made of that group the European and international force it never became?

True, ICL management had come to fear and detest mergers, with good reason. But ICL would have been by far the most powerful partner in the grouping and that quartet, with backing from the areas in Europe spending the most on computer installations and applications, would have enjoyed a "captive" market comparable in some degree with that provided by the U.S. Government through General Services Administration.

It is still not too late to achieve greater unity of purpose. The justifying figures for such action are there for any politician or civil servant to consult. Whether they are culled from forward computer projections, or from growth of micro-electronics, the inference is the same. In the latter case, it

Computer and Office Equipment Surveys 1979

The Financial Times is planning to publish a number of Surveys on Computers and Office Equipment. The titles and proposed publication dates of those planned are listed below. Other titles may be added during the course of the year.

April 19	CALCULATORS
May 14	COMPUTER SOFTWARE
July 10	WORD PROCESSING
July 17	COMPUTER FINANCE & LEASING
October 23	OFFICE EQUIPMENT
December 4	COMPUTER PERIPHERALS

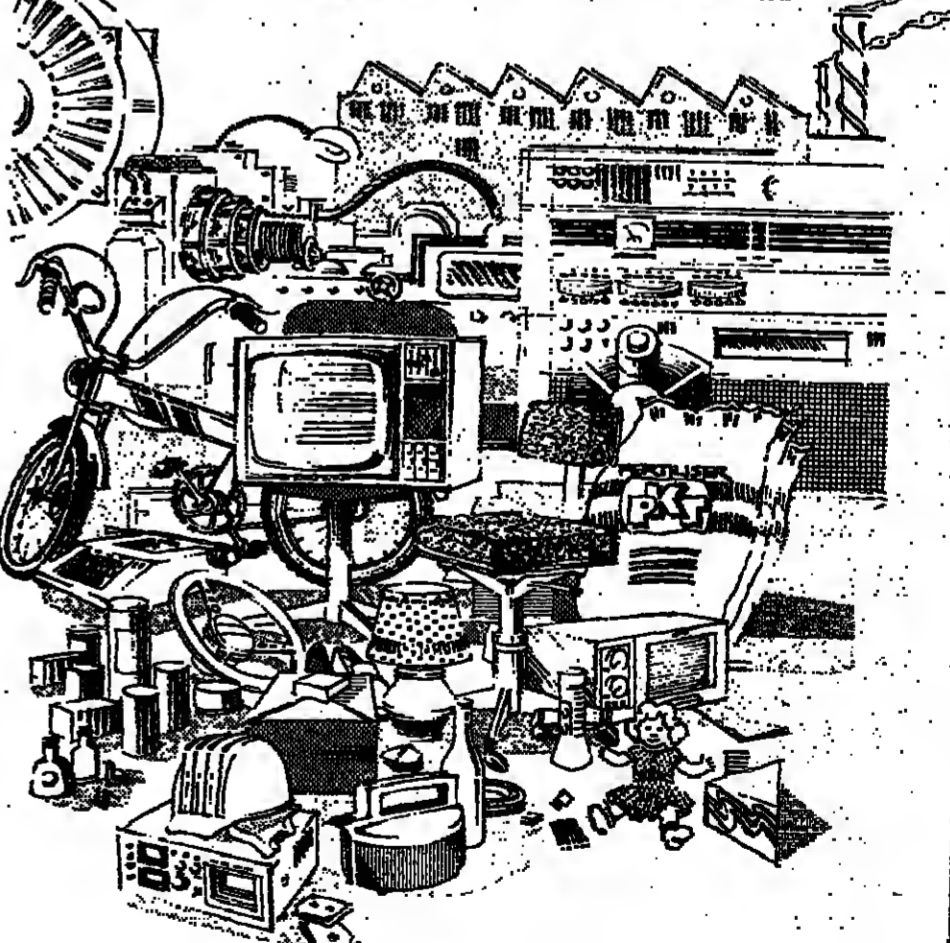
Surveys are a powerful advertising medium offering advertisers the means to reach the Financial Times' influential readership in a relevant context.

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هنا من التحويل

THE COMPUTER INDUSTRY XI

Banks unhappy with systems offered

ANY TERMINAL equipment supplier wanting to make an impression on the banking sector could do worse than spend three weeks in the company of Mr. Gordon Hague, general manager of Lloyds Bank's management services division.

face between all four computers. "We had to go to an outside organisation to get switching equipment designed."

Staff

Lloyds and other banks in the UK have used computer systems effectively in sustaining a rate of expansion which implies a doubling of their business every eight to 10 years.

processing at NatWest, says computers have helped staff by taking over the drudgery and by evening out the workload.

"We have not gone recruiting junior people who can only work a machine and whom we would not like ever to meet a customer," he says.

the "cashless society"—a study of an electronic funds transfer system which would involve the installation of terminals at points of sale.

As it is Mr. Nicholas expects the question of who will pay for the system to be a stumbling block. The study is nowhere near deciding on costs, but there will eventually be a lot of discussion about who pays for what.

Paul Smith

Larger memory devices

MICRO ELECTRONIC memories have impinged on the public consciousness in the UK in the past year, in part because the Prime Minister has given micro-electronics the official status of constituting a revolution.

memories over the coming years will grow rapidly, possibly very rapidly. Since a major market for memories is in computers, both mainframes and mini-computers, then these hopeful projections depend to a considerable degree upon an upward trend in computer sales.

the UK, or expanding their existing bases: all of them see, or hope for, significant growth in the West European memory market in the 1980s.

years of strong increase (though there will still be a multitude of uses for it, as there still are for the 4K and even the 1K: no one advance in memory devices entirely displaces the previous innovations).

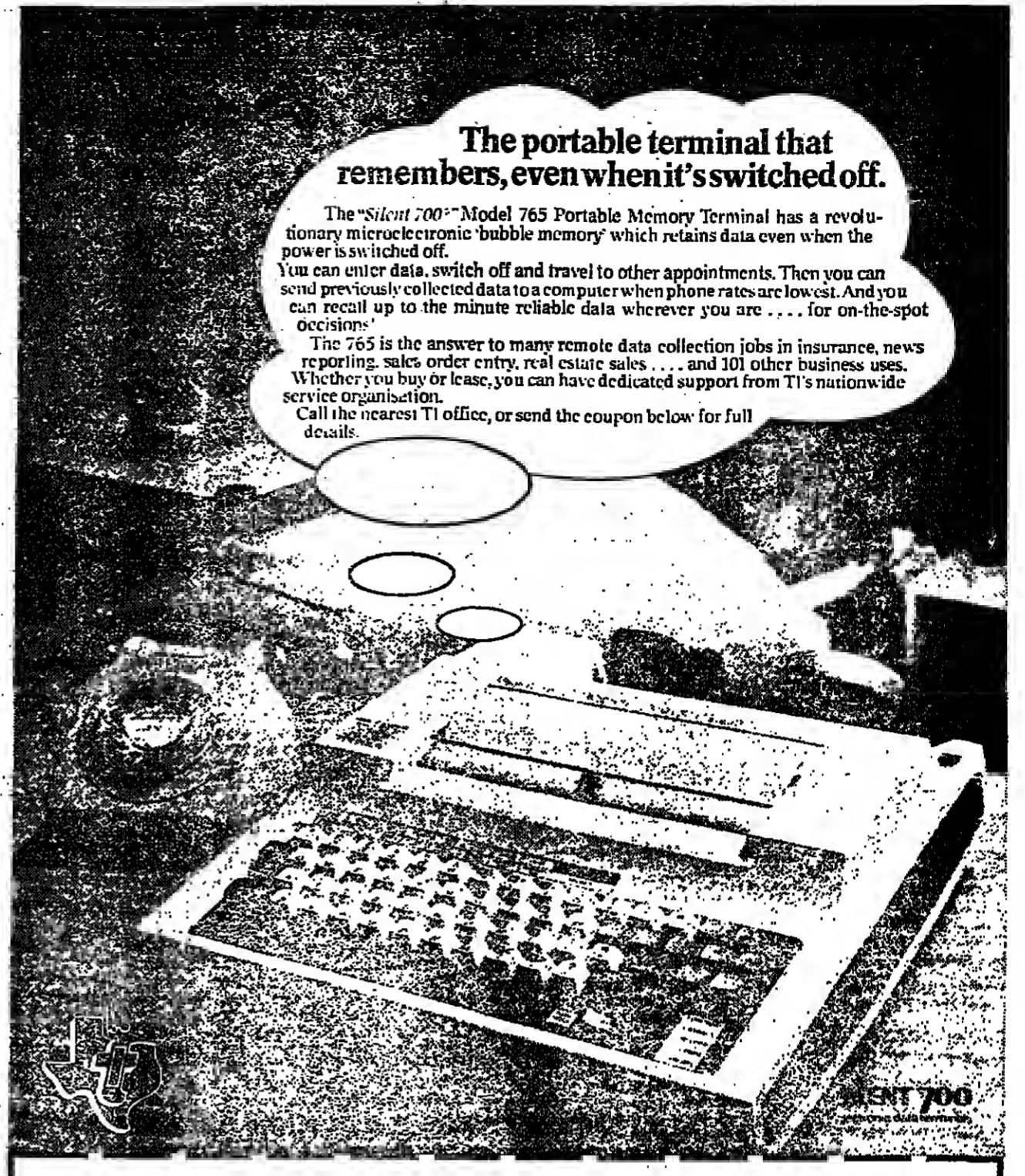
..and I want it now
Where's my Shipping Status Report?
Where's the Monthly Report?
Where's my Debtor's Analysis?
What about my Accounts Payable Numbers?
Where's my Salary and Wages Report?
..and my Stock Status Report?

When your application demands become overwhelming, consider the INFOREX SYSTEM 5000. A tool for your file management application problems.

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IBM has introduced its own 64K RAM (as usual, for its own use) and ITT is testing its 64K RAM, as is Texas Instruments. Next year, the 64K will begin to displace the 16K, and the latter will begin to enter a declining production period after some time.



The portable terminal that remembers, even when it's switched off.

The "Silent 700" Model 765 Portable Memory Terminal has a revolutionary microelectronic 'bubble memory' which retains data even when the power is switched off.

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Now £499 buys you a new computer, scientific controller, learning aid, teacher, engineer. Commodore PET advertisement with image of the computer and detailed text about its features and pricing.

INTERNATIONAL COMPANIES and FINANCE

RECENT ISSUES

MEDIUM-TERM CREDITS

Brazil Electrobras achieves better terms for \$400m loan

BY JOHN EVANS

ELECTROBRAS, the Brazilian state electricity concern, is raising a \$400m medium-term loan with conditions which represent a further improvement in the terms of Brazilian state risk in the Euromarkets.

SWISS DOMESTIC BONDS

Losinger blames lower rate for thin response

BY JOHN WICKS IN ZURICH

THE BOND ISSUE of SwFr 20m by Losinger AG, the leading Swiss building concern, of Bern, was not fully subscribed when it was offered on the domestic market from February 8 to 12.

Profits fall at Finance Corporation of Australia A. T. and T. seeks to hold off \$30m payment to Iran

By Our Sydney Correspondent

THE Bank of Adelaide's fully-owned finance company, Finance Corporation of Australia, has reported a fall in earnings of 66 per cent, from A\$2.1m to A\$715,000 (U.S.\$312,000) in the half-year to December 31.

NEW YORK—The American Telephone and Telegraph Company said that the motion it had filed for a restraining order to prevent manufacturers Hanover Trust Company from paying \$30m to the present Iranian government relates to a fund set up by Iran.

AT and T said that it did not know whether the present government, which it claims has no legal rights to those funds, has made any attempt to obtain the payments, but the motion was filed to prevent any possible request from being honoured, if one is made.

towards foreigners, who propose to establish a system of laws based on Islamic religious laws rather than internationally recognised standards of commercial law.

Advance at supermarket chain

CINCINNATI—Kroger Company, the U.S. supermarket concern raised its net profit by 61 per cent in the fourth quarter of 1978, to \$30.10m, or \$2.21 a share, from \$18.65m, or \$1.38, in the same period of the previous year.

Stores reported record operating earnings in 1978 but added that gains might be tempered this year as a result of its new store building programme and start-up expenses at its Florida distribution centre.

increased gross profit dollars from sale of higher margin products and specialty items, while competitive prices on staples were maintained.

Earnings rise at Kohler Brothers

BY JIM JONES IN JOHANNESBURG

KOHLER BROTHERS, South Africa's second largest printing and packaging group and a 72.6 per cent-owned subsidiary of Union Corporation, has benefited from the South African economy's emergence from recession.

result of acquisitions. According to the chairman, Mr. Basil Landau, Kohler's profit improvement arises largely from the streamlining of operations carried out over a year ago when it became obvious that South Africa's economy was headed for a slowdown.

packaging group. But according to Mr. Landau, Kohler does not see this as a set-back. It is actively seeking new acquisitions compatible with its existing interests in the paper, packaging and plastics fields.

CURRENCIES, MONEY and GOLD

Dollar on thin ice

BY COLIN MILLHAM

President Carter's comments last week about the situation in Iran tended to minimise the problems associated with the withdrawal of Iranian oil, probably with the intention of soothing the foreign exchange market.

any large scale, although the West German Bundesbank bought \$13m on Wednesday, the largest amount this year.

CURRENCY RATES

Table with columns for Currency, Rate, and Date. Includes Sterling, U.S. dollar, Canadian dollar, etc.

THE POUND SPOT

Table showing pound spot rates for various currencies like U.S., Canadian, etc.

EXCHANGE CROSS RATES

Table showing exchange cross rates between various currencies like Pound Sterling, U.S. Dollar, etc.

LONDON MONEY RATES

Table showing London money rates for overnight, 7 days, 14 days, etc.

THE DOLLAR SPOT AND FORWARD

Table showing dollar spot and forward rates for various currencies.

OTHER MARKETS

Table showing other market rates for Argentina, Australia, Brazil, etc.

MONEY RATES

Table showing money rates for New York, Germany, Japan, etc.

FRANCE

Table showing French money rates for overnight, 1 month, 3 months, etc.

EQUITIES

Table of equity prices for various stocks like Caledonian, etc.

FIXED INTEREST STOCKS

Table of fixed interest stock prices for various bonds.

RIGHTS OFFERS

Table of rights and offers for various companies.

Renunciation done usually last day for doing lots of stamp duty. Figures based on prospectus figures. Assumed dividend and yield. Forecast dividend based on previous year's earnings.

CLIVE INVESTMENTS LIMITED 1 Royal Exchange Ave., London EC3V 3LU. Tel: 01-283 1101.

ALLEN HARVEY & ROSS INVESTMENT MANAGEMENT LTD. 45 Cornhill, London, EC3V 3PB. Tel: 01-623 6314.

I.G. Index Limited 01-351 3466. Three month Silver 382.6-385.6 29 Lamont Road, London SW10 0HS.

Public Works Loan Board rates

Table showing public works loan board rates for various terms like Up to 5 years, etc.

HK lending rates up

BY PHILIP BOWRING IN HONG KONG

HONG KONG'S two largest banks, the Hongkong and Shanghai and Chartered are raising their best lending rate by a further 1 per cent to 10.5 per cent from today.

Though this is the fourth rise in best lending rate since November 1, when the rate was only 6 per cent, the Government and many outside observers have maintained that the banks have been very tardy in raising lending rates, thereby fuelling an excessive rate of money growth.



Banco Nacional do Desenvolvimento Economico

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هنا من العمل

INSURANCE

English law out of tune with EEC

BY OUR INSURANCE CORRESPONDENT

FOR NEARLY 900 years English lawyers and legislators have been able to develop our laws as they have thought fit, without being obliged to take notice of developments in the Continent or in the English-speaking world...

proposals contained in the fifth draft of the directive but to recommend far-reaching changes in our insurance laws which take little or no account of the weight of insurance legal opinions on the Continent...

APPOINTMENTS

Senior position at Black and Decker

Mr. Francis P. Lueder, president and chief executive of Black and Decker Manufacturing Company of the U.S., has become chairman in place of Mr. Alvin G. Decker, who is retiring from that position...

Brigadier R. C. Halse has been appointed as the first Colonel Commandant of the newly formed ARMY LEGAL CORPS. Superintendent E. S. A. Craig-McCoy, WRNS, becomes director of the Women's Royal Naval Service in the rank of Commandant in July 1979...

WORLD STOCK MARKETS

NEW YORK - DOW JONES

Table with columns for Date, High, Low, and various market indices like Industrial, Transport, and Trading volume.

Table showing indices for various countries including Australia, Belgium, Denmark, France, Germany, Holland, Hong Kong, Italy, Japan, and Singapore.

EUROPE

AMSTERDAM

Table of stock prices and changes in Amsterdam, including companies like Ahold, Alcoa, and Agip.

BRUSSELS/LUXEMBOURG

Table of stock prices and changes in Brussels/Luxembourg, including companies like Afbec, Alcoa, and Agip.

SPAIN

Table of stock prices and changes in Spain, including companies like Banco Bilbao, Banco Central, and Banco Exterior.

TOKYO

Table of stock prices and changes in Tokyo, including companies like Asahi Glass, Canon, and Daiichi Kangyo Bank.

VIENNA

Table of stock prices and changes in Vienna, including companies like Creditanstalt, Erste Bank, and Sberbank.

COPENHAGEN

Table of stock prices and changes in Copenhagen, including companies like Andelsbanken, Danske Bank, and East Asiatic.

GERMANY

Table of stock prices and changes in Germany, including companies like AEG, Allianz, and BASF.

CANADA

Table of stock prices and changes in Canada, including companies like Albitol Paper, Alcan, and Alcan Aluminum.

MILAN

Table of stock prices and changes in Milan, including companies like ANIC, Agnelli, and Alitalia.

OSLO

Table of stock prices and changes in Oslo, including companies like Aker, Aker Brygge, and Aker Mølle.

PARIS

Table of stock prices and changes in Paris, including companies like Air Liquide, Alcatel, and Alstom.

AUSTRALIA

Table of stock prices and changes in Australia, including companies like ACMI, Alcoa, and Alcoa Australia.

BRAZIL

Table of stock prices and changes in Brazil, including companies like Alcoa, Alcoa do Brasil, and Alcoa do Rio de Janeiro.

JOHANNESBURG

Table of stock prices and changes in Johannesburg, including companies like Anglo-American, Anglovaal, and Anglovaal Consolidated.

WALL STREET

NEW YORK

Table of stock prices and changes in New York, including companies like Alcoa, Alcoa Aluminum, and Alcoa Chemical.

STOCK

Table of stock prices and changes in various sectors, including Alcoa, Alcoa Aluminum, and Alcoa Chemical.

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Table of stock prices and changes in various sectors, including Alcoa, Alcoa Aluminum, and Alcoa Chemical.

NOTES: Overseas prices exclude S premium. Belgian dividends are after withholding tax. All prices are in local currency unless otherwise stated. All prices are in local currency unless otherwise stated. All prices are in local currency unless otherwise stated.

INTERNATIONAL CAPITAL MARKETS

INTERNATIONAL BONDS

Speed draws the U.S. borrower

AMERICAN corporations are back in the Eurodollar bond market in full force...

may find the offshore bond network gives a useful pricing advantage.

than usual, as FRNs are usually linked to longer-term dollar deposit rates.

treasurers might have one eye on the possibility of official curbs on the international credit market.

was trading at 97.98% to yield over 10 per cent.

U.S. corporations have tended to disregard the Eurobond market for their dollar needs...

Portland General Electric has also just scheduled a \$500 million bond issue...

While U.S. rates are expected to peak later this year, American inflationary pressures may mean a protracted period of high interest rates.

The secondary Eurodollar bond market continued to retreat slowly last week...

Reflecting deteriorating conditions, Westdeutsche Landesbank raised the coupon on the DM 100 million eight-year CNT offering...

JAPANESE LENDING

Problems of funding start to ease

BANKERS who regarded the Japanese challenge as a major factor in last year's precipitous fall in lending margins...

the international money markets late last year. This was in one sense surprising because Japanese banks borrowing from other banks round the world...

Under the regulations, as they operated last year, Japanese banks were required to match new medium-term lending with deposits which were not due to mature for at least a year and a day.

dates resulted in a scrimmage for long-term funds last November to December.

term loans, rather than 100 per cent of new lending.



BY JOHN EVANS

CURRENT INTERNATIONAL BOND ISSUES

Table with columns: Borrowers, Amount m., Maturity, Av. life years, Coupon %, Price, Lead manager, Offer yield %.

JAPANESE LENDING

BY MARY CAMPBELL

U.S. BONDS BY STEWART FLEMING

Waiting on the sidelines for less uncertain trends

THE CREDIT markets have traded uneasily at the lower levels established earlier in the month with prices broadly unchanged last week in very light trading.

In the money markets, short-term interest rates were virtually unchanged in most sectors and although the weekly average Federal funds rate moved up a notch this is generally seen as a reflection of seasonal factors in the Fed's operations.

of the economy is now being questioned more widely in the wake of the publication of modest rates of gain for industrial production and personal income in January and a 20 per cent slump in housing starts.

FT INTERNATIONAL BOND SERVICE

Table of U.S. DOLLAR STRAIGHTS with columns: Issued, Bid, Offer, Change on day, Yield.

Table of YEN STRAIGHTS with columns: Issued, Bid, Offer, Change on day, Yield.

Table of OTHER STRAIGHTS with columns: Issued, Bid, Offer, Change on day, Yield.

Advertisement for Osterreichische Kontrollbank Aktiengesellschaft, U.S. \$50,000,000 Guaranteed Floating Rate Notes 1988. Includes text about the notes, interest rates, and contact information.

AUTHORISED UNIT TRUSTS

Table listing various unit trusts such as Abbey Unit Trst. Mgrs., Allied Hambro Group, and others, with columns for fund names and performance metrics.

Table listing insurance and property bonds, including companies like Abbey Life Assurance Co. Ltd., Axa Insurance Co. Ltd., and others, with details on policies and rates.

Table listing various securities and investment funds, including Pearl Trust Managers Ltd., Save & Prosper Securities, and others, with columns for fund names and performance.

Table listing offshore and overseas funds, including Alexander Fund, Keyser Ullmann Ltd., and others, with columns for fund names and performance.

CORAL INDEX: Close 454.59. Table showing various index values and percentages.

Table listing insurance and property bonds, including companies like Abbey Life Assurance Co. Ltd., Axa Insurance Co. Ltd., and others.

Table listing various securities and investment funds, including Pearl Trust Managers Ltd., Save & Prosper Securities, and others.

Table listing offshore and overseas funds, including Alexander Fund, Keyser Ullmann Ltd., and others.

NOTES

BUSINESSMAN'S DIARY

Table with columns: Date, Title, Venue. Lists various trade fairs and exhibitions such as 'UK Trade Fairs and Exhibitions' and 'Overseas Trade Fairs and Exhibitions'.

Table with columns: Date, Title, Venue. Lists business and management conferences such as 'Cranfield School: Young Managers Course' and 'CEL: International Financial Management Seminar'.

Table with columns: Date, Title, Venue. Lists various seminars and courses including 'Cranfield School: Young Managers Course' and 'CEL: International Financial Management Seminar'.

NEWS ANALYSIS: WHY CANADA'S ROYAL BANK BIDS HIGH

The lure of Britain's credit boom

BY WILLIAM HALL

THE Royal Bank of Canada's planned acquisition of Western Trust and Savings has surprised many bankers. Why should Canada's largest bank, which has been operating here since before World War I, suddenly decide to buy a small West Country consumer finance company?

On an unsecured basis, its clientele tends to be down-market from the average clearing bank customer, but judging by the growth in its asset base there is plenty of demand for its services. With the backing of Royal Bank of Canada, Western Trust plans to open 85 new branches over the next 5 years.

Table titled 'FOREIGN OWNED UK FINANCE COMPANIES'. Columns: Company Name, Offices, Assets (£m), Pre-tax profits (£m).

market than Citibank Trust and is a relative newcomer to the UK market, having opened its first branch only in October 1974. However it now has 67 branches dotted around the country and plans to have close to 200 by the end of 1983.

MOTOR CARS

Remember, you can lease any make of car. Includes a grid of car brands like Ford, Rover, Vauxhall, etc.

Stratstone (Leasing) Limited. Contact Brian Chambers or John Davey at Virginia Water. Station Parade, Virginia Water, Surrey.

PREMIER MOTOR GROUP. Invites fleet operators to save up to £7,250.00 on the following vehicles for IMMEDIATE DELIVERY. Lists models like Rover 3500 Auto, Rover 3500 Manual, Rover 2600 Auto, Rover 2300.

REGISTRATION NUMBERS. Table with columns: Car Model, Registration Number, Price. Lists various car models and their registration details.

AUTOSEARCH LTD. 1978 1 REG PORSCHE 928 AUTO. Guards Red with Black Leather. Black and White check cloth centers. Cruise control. Delivery mileage. £25,950.

WATERLOO CARRIAGE. England's largest Lancia dealer. 38-48 THE CUT SE1. Telephone 01-928 1922 Telex 917033.

The Chequered Flag. Lancia. Full Gamma & Beta range from over 100 cars. For sale or lease. Chitwick High Road, London, W.A. Tel: 01-995 0022, Telex: 881126.

BATES OF MALDON. THE LEASING EXPERTS. A SMALL SELECTION OF USED CARS. 1979 BMW 733i Automatic. Black with black vinyl interior. Grey sports BMW extra. FROM £11,235 PER WEEK.

MILCARS OF MILL HILL. Lease your BMW the Milcars way. A selection of used BMWs. 1979 633CSi AUTOMATIC. Polaris Silver with Blue Leather interior. Electric sunroof. Wipers. Twin electric mirrors. FROM £108.72 per week.

New Issue February 1979. All the securities having been sold, this advertisement appears as a matter of record only.

Bayer International Finance N.V. Curaçao/Netherlands Antilles. US-\$ 200,000,000. 7 1/4% US-Dollar Bonds due 1989 with Warrants. unconditionally and irrevocably guaranteed by Bayer Aktiengesellschaft, Leverkusen/Federal Republic of Germany.

Table listing various international banks and financial institutions such as Deutsche Bank, Morgan Stanley International, Credit Suisse First Boston, etc.

INDUSTRIALS - Continued

Table of industrial stocks including companies like British Petroleum, Shell, and ICI, with columns for stock price, dividends, and other financial metrics.

INSURANCE - Continued

Table of insurance companies such as Lloyds, Norwich Union, and Prudential, listing their stock prices and financial data.

PROPERTY - Continued

Table of property-related stocks and trusts, including various real estate investment trusts and property companies.

INVESTMENT TRUSTS - Cont.

Table of investment trusts and funds, providing details on their assets, performance, and share prices.

FINANCE, LAND - Continued

Table of finance and land-related stocks, including banks, insurance companies, and land investment trusts.

Advertisement for SANWA BANK, Tokyo, Japan, featuring the slogan 'Serving the world with financial expertise.' and the bank's name in large letters.

MINES - Continued

Table of mining stocks, including Australian and international companies like Anglo American and De Beers.

TINS

Table of tin-related stocks and commodities, listing prices and market data.

OVERSEAS TRADERS

Table of overseas trading companies, including firms like Jardines and Guthrie & Co.

RUBBERS AND SISALS

Table of rubber and sisal stocks, listing prices and market information.

TEAS

Table of tea stocks, including companies like Tata Tea and Unilever.

INDIA AND BANGLADESH

Table of Indian and Bangladeshi stocks, listing various companies and their market values.

SRI LANKA

Table of Sri Lankan stocks, including companies like Ceylon Tea and Ceylon Rubber.

AFRICA

Table of African stocks, listing companies from various African nations.

MINES

Table of mining stocks, providing a detailed list of companies and their financial metrics.

CENTRAL RAND

Table of Central Rand mining stocks, listing prices and market data.

EASTERN RAND

Table of Eastern Rand mining stocks, providing market information for various companies.

FAR WEST RAND

Table of Far West Rand mining stocks, listing prices and market values.

O.F.S.

Table of O.F.S. (Overseas Financial Services) stocks, listing companies and their market data.

FINANCE

Table of finance stocks, including banks and financial institutions.

DIAMOND AND PLATINUM

Table of diamond and platinum stocks, listing prices and market information.

CENTRAL AFRICAN

Table of Central African stocks, listing companies and their market values.

REGIONAL MARKETS

Table of regional market data, including stock prices and market indices from various countries.

OPTIONS

Table of options market data, listing call and put options for various stocks.

3-month Call Rates

Table of 3-month call rates, listing interest rates and market data for various currencies.

